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Energy Vice Minister Discusses Energy, the Environment, and Economic Development

926B0002A Beijing ZHONGGUO NENGYUAN [ENERGY OF CHINA] in Chinese No 8, 25 Aug 91 p 1

[Article by Lu Youmei [7120 0147 2812], vice minister of energy]

[Text] 1. Under the sponsorship of the United Nations Technical Cooperation Department, the "International Conference on Energy, Environment and Economic Development" in Beijing is an important meeting. We are particularly pleased that Deputy Secretary General Mr. Ji Chaozhu [0370 2600 6999] will appear in person. This meeting has attracted world attention and the support of developing nations, which are sending representatives to the meeting.

2. Environmental protection and economic development form an organic whole. Economic development of the society relies on the energy industry, which is one of the major pollution sources of the environment. In the meantime, problems in environmental protection and management can only be solved by developing the economy of the society.

3. The backward economy of the developing nations is the result of historical reasons and injustice in reality and irrational international economic relations. In order to accelerate their economic development, the developing nations cannot be blamed for increasing their energy consumption and utilizing more mineral resources. This is unavoidable in development.

4. Developing nations can increase their ability to protect the environment only by accelerating their economic development.

5. China is a developing nation and a major country for energy production and consumption. China is among the leading countries in the world in energy production and consumption, but its per capita energy consumption is only one-third of the world average. In China's economic development and drive to raise the standard of living, the per capita energy consumption will naturally increase.

6. Atmospheric pollution, acid rain, damage to the ozone layer, and greenhouse effect due to the release of CO_2 are no longer environmental problems of one country or region; they are problems of global environmental deterioration. The survival and development of human society are facing an increasingly severe threat and have attracted the attention and concern of the world. Faced with an increasing energy consumption, each country must consider the problem of how to reduce atmospheric pollution and protect the environment while they formulate their strategies for economic development.

7. China has carefully formulated various effective measures to reduce pollution when setting its future economic development plan. These include population control to reduce energy consumption, conserve energy and improve the rate of utilization, reduce the energy consumption per unit value of the gross national production, and adjust the energy structure to make fuller use of hydroelectric power. The percentage of nuclear power will be systematically increased while maintaining safety and economy. Efforts will be made to develop new energy resources, solar energy, wind energy and geothermal energy. Research will be actively pursued to develop hydrogen energy, ocean thermal energy, high efficiency photovoltaic conversion technology and new types of nuclear energy. In the meantime, the economic system reform will be deepened, the energy pricing policy will be rationally adjusted, conservation will be promoted by market mechanism, and efficiency will be raised. The Chinese Government will be adopting a comprehensive approach to avoid the development-pollution-treatment cycle experienced in the industrialization of developed nations so that economic development and environmental protection can be achieved simultaneously.

8. Industrially developed nations, with a per capita energy consumption several times that of developing nations, release 75 percent of the CO_2 into the atmosphere. The developed nations are mainly responsible for causing irreversible environmental pollution to the planet. Faced with this fact, the developed nations should use their ample wealth and advanced technology to shoulder more responsibility for global environmental management. Developed nations should limit the level of energy consumption in their countries, limit the release of CO_2, and support the economic development and environmental protection efforts in developing nations with their money and technology. The transfer of polluting industries to developing countries should be forbidden.

9. I believe China is willing to work with other countries in the world in the area of development and environmental protection. Under a joint effort, the human race is capable of making the planet cleaner and more beautiful.

Energy Projects Exceed State Plan

40100018F Beijing CHINA DAILY (Economics and Business) in English 7 Jan 92 p 2

[Text] The State Energy Investment Corporation, China's key investor in the energy sector, overfulfilled its 1991 capital construction plan to increase the country's electricity generation capacity, an official with the corporation told CHINA DAILY yesterday.

The growth in electricity generation and power transmission abilities due to the generous investment have "effectively eased the shortage of electricity in some areas," the official Wang Xianguang said.

In 1991, Wang said, 30 sets of large and medium-sized electricity generators were put into operation and their annual electricity generating capacity reached more than 5.28 million kilowatts, surpassing the State-set figure by 60.4 percent.

Of the total, 20 sets, with a capacity of 4.26 million kilowatts, were coal-fueled generators and the remaining 10, with a capacity of nearly 1.02 million kilowatts, were hydro-power generating machines, Wang explained.

Meanwhile, the corporation also helped localities put 15 more sets of generators, with a total generating capacity of 205,500 kilowatts, into production, Wang said.

Last year, the corporation also completed the construction of 4,555 kilometres of power transmission lines of 110 kilovolts and above, as well as transforming substations with a total annual power transforming capacity of more than 8.24 million kilovolt-ampere (KVA), Wang said.

Both exceeded the State-planned figures by 30.7 percent and 3.6 percent respectively, Wang said.

Prospects for Petroleum Exports in the 1990's

926B0002B Beijing ZHONGGUO NENGYUAN [ENERGY OF CHINA] in Chinese No 8, 25 Aug 91 pp 6-9

[Article by Yuan Fuxue [5913 4395 1331] and Yin Jianping [3009 1696 1627] of the Petroleum University]

[Text] Petroleum is a pillar of the world economy. Petroleum consumption is a measure of the development of a country. In terms of crude oil production, China is one of the major forces in the world. But due to the large population, the per capita oil consumption in China is still low, being 92 kg in 1986, 96 kg in 1987, and 102 kg in 1988, only about one-fifth of the world average. Compared to advanced nations, the difference (see Table 1) is very large.

Table 1. Per Capita Oil Consumption in 1986 in Some Countries (kg/person)

Country	Canada	USA	Japan	France	W. Germany	UK	USSR	China	World
Quantity	2,380	2,608	1,350	1,268	1,167	1,220	1,785	92	560

Source: 1989 China Energy Statistics Annual, p 398

To achieve the strategic goal of quadrupling China's gross value of agricultural and industrial production by the end of this century, the supply of petroleum must be protected. Balancing the supply and demand of petroleum will be an urgent job in the next 10 years.

I. Prospects of Petroleum Production and Consumption in the 1990's

1. Domestic Crude Oil Production Growth Will Be Limited

In the 1980's China produced a total of 1.1962 billion tons of crude oil, which made the 1980's the most productive decade for crude oil. The annual output of crude went from 105.95 million tons in 1980 to 137.65 million tons in 1989. The overall trend has been steady for some growth. The results in Table 2 show that the rate of growth in crude oil production has obviously tapered off after the mid-1980's. The growth in 1985 was 10.29 million tons, but the crude oil production in 1989 increased only 610,000 tons. It has been increasingly difficult to increase the crude production.

Table 2. Crude Oil Production in China in the [1980's]

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Output (10,000 tons)	10,595	10,122	10,212	10,607	11,461	12,940	13,069	13,414	13,704	13,765
Increase (10,000 tons)			90	395	854	1,029	579	345	290	61

Source: China Economic Annuals, 1985-1989 data

According to the long-term plan for the petroleum industry, the crude output should reach a level of 150 million tons in 1990 and 200 million tons in 2000. It would not be easy to average an increase of 6.2 million tons for the next 10 years. The reasons are: 1) Most of the oil fields have entered the middle or late stage of development. The difficulty for mining the crude oil has increased, the rate of decrease for crude output has accelerated, and the price of raw material has gone up. As a result, the cost for mining crude oil has become higher and higher and the amount of crude output per unit investment is getting smaller and smaller. To average an annual increase of 6.20 million tons in the next 10 years would require an annual investment of 3 billion yuan or more. This would be too much of a burden because China will be entering its peak of debt payments in the 1990's. 2) The scale of offshore oil development will not be very large. According to the Ocean Petroleum General Company, there will be seven offshore oil fields put into production in the next three years. By 1992 the output of these seven oil fields will reach 5 million tons and the crude oil output in 1995 will be 8 million tons. Under the present oil price structure, ocean oil fields are economically marginal oil fields because of their small output and high cost. It is unlikely that output from ocean oil fields will exceed 10 million tons by 2000. 3) New discoveries of oil in the Tarim Basin brought new hopes in China's petroleum industry. However, the weather conditions in Tarim are very harsh and the cost for developing crude oil is extremely high. In addition, a 6,000-kilometer-long pipeline needs to be built, which requires considerable technology and investment. Just the pipeline alone will cost 10 billion yuan of investment. In the Eighth 5-Year Plan the China Petroleum and Natural Gas General Company plan to complete a survey of 1.5 billion tons of reserves, control 1 billion tons of reserves and reach a crude oil output of 20 million tons by the end of the century. But the problem of demand exceeding supply for oil in China in the next 10 years will not be alleviated before the large-scale export of crude oil is solved.

2. Unabated Oil Consumption in China

From 1980 to 1989, oil consumption in China grew almost 20 percent. In the next 10 years, the gross value of agricultural and industrial output in China will be doubled again, and the consumption of oil will grow at an annual rate of 6 to 7 percent. To achieve such a high growth rate, the oil production must increase at least 3 to 4 percent per year. Even at that rate, the demand of oil consumption in China will be far from satisfied. Experts estimate that the consumption of gasoline, kerosene, and diesel fuel in China in the year 2000 will be 106.06 million tons and there will be a shortage in gasoline and diesel fuel of at least 30 million tons. Take automobiles as an example. There were 3.21 million automobiles in China in 1985, consuming 13.82 million tons of gasoline and diesel fuel per year, or 40 percent of sales. The number of automobiles is estimated to be 12 million by the year 2000, requiring an annual consumption of 47 million tons of processed oil. But the estimated amount of oil available for automobiles will be only 31 million tons, creating a shortfall of 16 million tons. As the standard of living of the general population improves in the last part of this century, high-quality energy resources for daily living (electricity, gas and gasoline) will grow considerably. It is certain that in the latter part of the 1990's the petroleum consumption in China will far exceed the domestic production ability.

3. Although the Potential for Conservation Is Great, the Implementation Is Difficult

The high energy consumption and low efficiency of the energy economy in China are well known. Statistics show that of the 10 major economic powers except the USSR, China consumed the highest level of energy in 1988 and the amount was five times that of the lowest nation, France. Through improved management and reduced consumption, the conservation effort in the 1980's was quite successful. It ensured a continuous, high rate of national economic growth with limited energy resources. In the 1990's, as the conservation effort deepens, the degree of difficulty will also increase. This is because the technological equipment in China is backward and has not been renewed or replaced in a long time. To lower the energy consumption on a large scale would require extensive replacement and renewal of equipment, which would naturally boost the cost. Data show that 10 years ago it took only 300 yuan to conserve 1 ton of standard coal, but now it takes 500 yuan. With suppressed energy prices, the greater the costs for conservation, the less motivated the units are to conserve. Therefore, although there is a great potential for further conservation in petroleum consumption, the task is very difficult and the amount for conservation is limited.

II. Seek To Import Oil and Satisfy Domestic Consumption

Economic growth and improvement in the standard of living have put increasing demand on petroleum. The difficulties in raising production of crude oil and the limited success of conservation have made the supply and demand problem more acute. How can we alleviate this problem so that the national economy can go forward, the standard of living can continue to improve, and the domestic need of petroleum can be satisfied? We feel that, without a major breakthrough in existing oil fields in east China and without large development of the offshore oil and oil in the Tarim Basin, part of the domestic need for petroleum may be satisfied by exporting less and importing more. This approach is feasible.

Theoretically, import of petroleum should be based mainly on the domestic need and economic consideration. With demand exceeding the supply in China, imports will be beneficial and feasible as long as the value created by importing far exceeds the cost of importing. In terms of economic benefits, if the value created by exporting is 1 (based on oil prices a few years ago), then 1.24 may be obtained by working on processed oil, 1.58 may be obtained by producing petrochemical products, and manufacturing light industrial products may bring in 5.28. Foreign statistics show that Saudi Arabia, Kuwait, and Venezuela earned 2 to 5 U.S. dollars per barrel by building export type refineries to process the crude oil rather than just selling crude oil. This amounted to 16 to 36 U.S. dollars per ton. Just because of this difference, it does not make sense for China to insist on exporting unprocessed crude oil. It is economically feasible to import crude and then export it after processing.

Conceptually we must change the bias that China can only export oil and not import oil. We should face the facts with an eye toward the future, a timely solution must be found when domestic oil production cannot satisfy the domestic need.

III. Mode of Oil Import: Digest and Absorb

The so-called "digest and absorb" mode of oil import refers to the following characteristics in China's future oil import: 1) The limited nature—China will not be importing great amounts of oil; instead, small batches will be imported. The domestic oil consumption will still rely mainly on domestic oil, and the imported oil will only play a role of supplementing and regulating the domestic market. 2) The diffused nature—The process of importing oil will not be done by the state in a central manner; instead, the various departments and regions will import oil according to their need and resources. 3) The transitional nature—The import of oil will not be a long-term practice. It will be done in stages and imports will stop once the domestic supply and demand are balanced. 4) The localized nature—The import of oil will be localized to a few regions and enterprises, the foreign exchange needed will be raised by themselves, the imported oil will be consumed or processed at their discretion, and the amount of import will be determined by their ability to pay in foreign exchange. Under this scheme, the import of oil will not disrupt the national balance of foreign exchange. The regions with the ability to import oil are mainly located in the eastern coastal area. In recent years, with the establishment of the four economic zones and the opening up of the coastal cities and Hainan Province, the amount of foreign exchange created in this region has increased substantially. In 1989 the four economic zones created $3.9 billion in foreign exchange and the 11 coastal cities had a total

export volume of $11.9 billion. The sum of these two amounted to $15.8 billion, or 30 percent of China's total export. In Guangdong Province alone, there were $7.371 billion worth of exports in 1988. In the next 10 years, as the economic development strategy is implemented in the coastal area, the area can take advantage of its technology, labor force, and transportation superiority to engage in high levels of import and export. The export ability of the coastal region will be further enhanced.

In the mid- and late-1990's, with the demand of petroleum in China exceeding the supply and oil imports being unavoidable, a practice of the "digesting and absorbing" mode of oil import will stimulate the petroleum industry and the national economy.

IV. Make Timely Adjustments To Suit the Situation of Oil Import

First, the state should have a macroscopic control on the variety and quantity of oil imports. The amount and quantity of oil import must be determined by domestic needs and the ability to pay. Uncontrolled and excessive import must be strictly forbidden. Therefore, the variety and amount of oil import and the channel for import must be approved by the state and put under the control of the national plan. The import should be primarily crude oil and other oil products will be limited so that the import program may proceed systematically and smoothly.

Second, the state should formulate an incentive policy to encourage the coastal region to actively participate in the competition in the international market. The use of imported oil has the following problems. First, it takes a large amount of foreign exchange; second, it is affected by the fluctuation of oil price on the international market; third, it affects the economy benefits. Therefore, the state should play a leveraging role in pricing, credit, and taxing. This would encourage the coastal areas to improve their export ability to create foreign exchange, to reduce the cost for importing oil, to improve the net gain in foreign exchange for enterprises engaged in processing the imported oil, provide them with some domestic oil as a backup so that they may react to the international oil market in a timely fashion in order to compete.

Third, encourage the coastal regions to import oil systematically and to improve petrochemical technology and product quality. For a long time China lagged behind in the export of processed oil and petrochemical products because oil processing and petrochemical technology in China has been falling behind the world advanced level. The low product quality has affected both the export price and the export quantity. To improve the competitiveness of petrochemical enterprises in the coastal region, the state must systematically guide the technological improvement and raise the technical level in oil processing and petrochemical production. Only by doing so can the present situation of high import and low export be turned around, and the overall technical level of oil processing and petrochemical industry be improved.

Rural Power Industry Has Record Year

40100018A Beijing CHINA DAILY (National) in English 8 Jan 92 p 3

[Text] China's rural power industry saw major development in 1991, the start of its Eighth 5-Year Plan (1991-95), as more medium-sized and small hydro-electric power stations came on stream.

The installed capacity of these stations, built during the year with funds from the State and local farmers, has, for the first time in decades, hit one million kilowatts, China Water Resources News reported.

As a result the hydropower stations, which are separate from the country's main power grid, can generate an additional 46.5 billion kilowatt-hours of electricity annually for rural areas.

Previously, it has been possible to increase the installed capacity of such rural hydropower stations by only 600,000 or 700,000 kilowatts a year, experts said.

The building of such stations was greatly speeded up in 1991.

An official from the Ministry of Water Resources attributed the success to the fact that many 1991 projects were put into operation with the support of government financial aid.

This would help the future construction of rural power networks at prefecture and county level.

By the end of 1991, statistics showed, a total of 925 kilometres of transmission lines carrying 110 kilovolts, 2,698 kilometres of 35 kilovolt-lines and 135,000 transformer-substations had been erected.

A programme of electrifying 200 counties which have water resources that could be used for small hydropower stations during the Eighth 5-Year Plan period, was launched.

The programme could improve many rural people's living standards and help lift them from the poverty-line of an annual per capita income of 200 yuan ($37) facilitating economic growth in these areas.

The programme has already brought power to 109 counties since 1982, helping them to at least double their industrial and agricultural output, and increasing farmers' per capita income from 203 yuan ($38) to 620 yuan ($116). (CD News)

Achievements in Energy Conservation and Future Tasks

926B0020A Beijing ZHONGGUO NENGYUAN [ENERGY OF CHINA] in Chinese No 10, Oct 91 p 31-34

[Article by Zhu Liangdong [2612 5328 2767] State Planning Commission, Resources Division]

[Text] **1. Achievements in Energy Conservation in the 1980's**

Over the last 10 years the policy of giving "equal importance to both the development of energy resources and to

conservation, and for the near term give preference to conservation" has been diligently adhered to. Throughout the country, from top to bottom, the leadership in energy conservation was strengthened, organizations were established and strengthened, energy conservation networks were formed, and in all sectors and areas special organizations were engaged in conservation work. From start to finish the State Council held six energy conservation working conferences, and through a series of measures involving adjustment of industrial structures, strengthening administration and technological progress, formulation of laws and regulations, new prospects for energy conservation were opened up; from tightening controls on runs, emissions, drips and leaks, to technological reform, remolding of industrial lines, and on to refurbishing old high energy consuming facilities, research-manufacturing new energy saving technology, new processes, new methods, and new facilities, the scope of energy conservation and reduction of consumption was constantly expanded; from factories to mines, from cities to villages, energy conservation became evident in every quarter.

1. Energy consumption per unit of national gross industrial output value decreased year by year. In 1980, consumption of energy resources per 10,000 yuan of national gross industrial output value was 13.36 metric tons of standard coal, in 1990 it was 9.3 tons, down 30 percent; the annual average energy conservation rate was 3.5 percent, of which the annual average during the Sixth 5-Year Plan was 4.7 percent and in the Seventh 5-Year Plan was 2.3 percent, and in round figures, the 10 year accumulated volume of conserved and little used energy resources was 270 million tons of standard coal. This had an important impact on assuring a sustained national economic development during the 1980s.

There has also been evident change in the coefficient of elasticity of energy resource consumption. From 1980 to 1990, the coefficient of elasticity was 0.56; during the Sixth 5-Year Plan it was 0.49, and in the Seventh 5-Year Plan it was 0.65. This illustrates that the growth of the national economy in the previous 10 years, by and large, depended in part on energy conservation. Compared with the coefficient of elasticity of energy resource consumption from the first through the fifth 5-year plans, which was 1.8, it was down about two-thirds. Although during the previous several 5-year plans, while China's industrial system was just being built, heavy industry was so dominant as to make comparisons meaningless, it does show that conserving energy or not conserving energy can make a big difference.

2. The energy consumption per unit of primary energy consuming products decreased. For 10 years, over 60 types of national key industrial products were studied, and the per unit consumption of nearly two-thirds of them decreased in varying degrees. The consumption of coal to power supplied by heat and power plants in 1980 was 448 grams of standard coal per kWh, and in 1990 it was down to 427 grams per kWh; energy consumption per ton of steel went from 2.04 tons standard coal to 1.625 tons; at key cement industries, consumption per ton went from 208.8 kg down to 201 kg; consumption of electricity per ton of electrolytic aluminum went from 20,342 kWh down to 16,750 kWh; at large-scale chemical fertilizer plants consumption per ton of ammonia went from 1.43 tons to 1.36 tons; consumption per ton of crude oil processed went from 129 kg to 105 kg; at oil and gas fields consumption rate per ton of extracted product went from 2.27 percent down to 1.76 percent etc. The utilization level of China's energy resources has clearly improved.

3. Conservation capabilities improve, economizing builds funds. The average per unit cost of saving 50 million tons of standard coal through energy conservation over a ten year period was one-third that of developing that amount of energy resources, a savings in energy resources equivalent to building a fund of 10 billion yuan. It is equivalent to building a 6.1 million kW heat and power unit, central heating for an area of 62 million square meters, a daily urban coal gas supply capability of 15 million cubic meters, an annual production of 12 million tons of briquets for public use, and an annual processing capability for washing and dressing 45 million tons of coal. This means excellent social and economic benefits toward alleviating energy supply needs and transportation pressures, improving the quality of the environment, reducing atmospheric pollution, and raising the standard of living of the people.

4. Comprehensive use of resources has been very successful. Consolidated use of extracted intergrowth minerals and associated mineral resources has caught the attention of the leadership at all levels. The multipurpose use of the three industrial wastes (waste gas, water residue, and waste water) is also fully developed. The utilization rate for solid waste materials by industries across the country is up to 28 percent, for example, the utilization rate of powdered coal ash by power plants is 25 percent, and the recovery rate of residual materials is nearly 30 percent. The utilization of these materials has very important benefits for prevention of environmental pollution, cutting loss of tillable land, pragmatic use of resources, and raising the schedule of comprehensive use of resources.

2. Basic Methods and Experience of 10 Years of Conservation Efforts

Basic methods:

1. Bring energy conservation into the national economic plan, and practice macroscopic oversight. Since 1981, energy conservation plans were formally entered into the national economic plan, and as the national economy developed, energy conservation also continued to broaden and develop and its presence increased step by step. Beginning in 1988, the energy resources plan was changed to the resources conservation and comprehensive use plan; it became a long-range plan and a part of the annual plan, and in various regions and sectors, resources conservation and comprehensive use became the guide for macroscopic adjustment and control.

2. Strengthen science administration, and formulate rules and regulations. In the Sixth 5-Year Plan various regions and sectors were engaged in extensive investigations and

research to determine what the enterprise waste situation and the prospects for energy conservation were, and from these findings, major institutes and colleges initiated over 30 special studies on the general processes, technologies, facilities, and installations of the high energy consumers, and formulated controls for energy conservation technology projects, and guidelines for 10 or more businesses, and at the same time, policies were formulated for 14 primary energy consuming metallurgical and chemical industries, 25 design standards for energy conservation were drawn up, as were over 600 standards for energy resources, and 20 primary rules and regulations for energy conservation, and thus was the way paved and direction clarified for a speedy development in energy conservation.

3. Adopt economic measures for a floating price structure for coal, electric power, and petroleum. In order to conserve petroleum, a special tax was levied on all processes and technologies that consume petroleum unnecessarily; low interest loans were granted to encourage energy conservation and technical reform measures, and rewards for conservation and fines for waste were created.

4. Rely on S&T advances. In recent years, combined production of heat and power, central heating, urban coal gas, and public use of honeycomb briquets have been developed; various kinds of backward processes and energy consuming facilities were rebuilt; and focusing on energy consuming industries such as, metallurgy, chemical industry, energy resources (electric power), and building materials, the development of application of new energy conservation technology, new processes, new facilities, new materials were carried out.

5. Adjust the economic structure. In 10 years, the product structure of industries, businesses, and enterprises were adjusted in varying degrees, and as adjustments in structures were made, savings in energy resources were able to keep pace with the accelerating changes. In recent years, 40-50 percent of savings in energy were the result of structural adjustments.

6. Establish a system for energy conservation, and form an energy conservation network. The State Council held energy conservation working conferences, and various ministries and commissions under the State Council set up energy conservation offices responsible for each ministry's systematic energy conservation work: In the economic committees of the provinces, municipalities, and regions, energy conservation offices were set up to be responsible for each area's energy conservation work; the State Planning Commission, as a comprehensive body for the national economy, set up a resources conservation and comprehensive-use division, which is responsible for issuing laws and regulations, and for planning, and also held periodic conferences with the two major systems to assure close coordination, dissemination of information, and exchange of experiences.

7. Perfect energy conservation propaganda. Using modern dissemination tools, magazines were published and television broadcasts were used to periodically spread the word on the importance of energy conservation, to raise the energy conservation awareness of all the people, and to make energy conservation become a long-range strategic thought process. The massive propaganda effort that ensued was very successful.

8. Increase foreign cooperation and exchange. To enable China to continue to absorb advanced world technologies and experiences into its own energy conservation effort, periodic exchange and technological cooperative relationships were established with countries advanced in energy conservation, such as France and Japan, and they have been helpful to China's energy conservation effort.

Basic experience:

1. The administration of energy conservation and reduction of consumption must be ever-ready. Administrative work is the foundation upon which all endeavors are advanced, and it is an important element in raising economic profits. It cannot be relaxed at any time, but can only be increased and strengthened. Practice has shown that no matter whether in a region, a sector or an enterprise, it is only through effectual administration that energy conservation and reduction of consumption can be accomplished. Through manifold thoroughness of administration, the Ministry of Metallurgical Industry, stressed systematic energy conservation, steadfast examination procedures for energy consumption, promotions for developing kilns, and constant raising of the level of administration, and made large scale reductions in the consumption of energy per ton of steel produced, and in the 12 years from 1978 to 1990, while steel production more than doubled, energy consumption only increased by one-third, and the accumulated energy savings in that 12-year period was 33.85 million tons of standard coal. The Beijing Yanshan Coal Corporation also, over a protracted period, strengthened administration, made technological progress, and realized unprecedented advancements in experience. These industries and enterprises gained experience for China, and set examples and directions for those studying energy conservation.

2. Great efforts must be made to increase investments. Although savings through investments in energy conservation is greater than savings through investments for developing energy, if investments are relaxed it will be difficult to make energy conservation gains in future. As the technology for energy conservation and reduction of consumption becomes even more advanced and technological difficulties increase, great efforts will have to be made to increase investment funds. This is necessary for the national economic situation and for development of energy conservation. Several provinces and municipalities have established their own funding for development of energy conservation, and employed the "snowball" method, gradually increasing their self development capability, with clearly effective results that are deserving of encouragement and support.

3. Striving to make exemplary models and pilot projects is the way to make steady progress in energy conservation and reduction of consumption, and they are also China's basic modus operandi. Whether spreading new technology or promoting comprehensive utilization of resources, China

must begin with models or pilot projects, and after gaining experience, then must again steadily disseminate the methods to get best results. In the Eighth 5-Year Plan, China will still further enrich and replenish this approach, and develop multilevel modelling and pilot projects in other areas and industries, and in this way bring along and promote resource conservation and comprehensive utilization.

3. Energy Conservation Gaps and Prospects

Although during the 1980's China made distinct gains in energy conservation and reduction of consumption and assured gains in the national economic development, when compared with industrially advanced countries, the prospects for energy conservation and consolidated use of resources in China is still very great. This is evident mainly in the low ratio of energy resource utilization, and in the disparity in economic profits, as are described in research reports on world energy resource economics. Computed in U.S. dollars per unit national gross output value, China's energy consumption is highest, more than 4 times that of France, more than 3 times that of England, 1.6 times that of India. There are incomparable factors; China's industrial structure is unlike that of industrially developed countries, but the energy resource utilization rate is low, there are shortfalls in economic profits, and there is serious waste. Looking at it from energy consumption per unit of primary products, China averages 40 percent higher than industrially advanced nations; coal consumption for thermoelectricity is 32 percent higher, for cement it is 66 percent higher, for plate glass it is 45 percent higher, and synthetic ammonia and pig iron are about 30 percent higher. According to preliminary estimates, if the effective utilization rate were raised to the level of industrially advanced countries, consumption would be reduced annually by over 300 million metric tons of standard coal, and this illustrates the great potential for energy conservation. The potential for comprehensive use of resources is even greater. The paragenetic and associated mineral resources of coal deposits are very rich, but only a small amount are recovered for use, the bulk of it being discarded and not used. The multipurpose use rate of national industrial solid waste materials is only 28 percent, less than half that of industrially advanced countries; the total volume of reprocessed resources from national annual output is over 70 million tons, a recovery rate of only 30 percent, and 30 percent less than that outside of China. Following the constant development of the national economy and society, there is a new requirement for conservation and comprehensive utilization of energy resources, and therefore, in the next 10 years, thorough measures must be adopted to genuinely deal with the equal importance of development and conservation, and especially, there must be guaranteed capital investment, and then this potential can gradually be made to serve socialist construction.

4. Energy Conservation Mission and Goals for the 1990's

The "10 Year National Economic and Social Development Plan and Outline of the Eighth 5-Year Plan" passed at the 4th Session of the 7th National People's Congress expressly requests that in 1995 a national primary energy resource gross output value of 1.172 billion metric tons of standard coal, an annual average growth of 2.4 percent, a national total of conserved and little used energy reserves equivalent to 100 million tons standard coal be achieved in 5 years; that China's second phase strategic targets be realized by the year 2000, and the overall quality of the national economy be lifted to new heights. From beginning to end, the central theme of the whole economy should be the raising of economic profits. In order to facilitate the work of strengthening and promoting energy conservation and reduction of consumption, the primary industrial products energy consumption targets must first be stipulated in the plan. The plan should have 70 energy consumption targets in 16 categories (coal, petroleum, electric power, petrochemicals, steel, nonferrous metals, building materials, chemical industry, light industry, textiles, machinery, forests, railroads, transportation, civil airlines, and small town enterprises); these targets should be directly tied to the results of the various industry's energy conservation efforts, and directly related to fulfillment of the energy conservation quotas of the Eighth 5-Year Plan. To meet these ends the following measures are to be adopted.

1. Strengthen leadership, and raise awareness. "Conservation of Energy Resources as a Long-Range Strategic Policy for China's Economic Development", that must be the heart of all energy conservation and reduction of consumption activities.

2. Strengthen examination of comprehensive energy consumption targets of areas and industries, and steadily link up the savings, allocation, and supply structures of energy resources. The various areas and sectors should define step by step the targeted national gross output value, industrial gross output value, and consumption per unit of primary products of the national economic and social plan, and bring them to fruition in industries and enterprises, and set up a rigid examination and investigation system. The energy conservation and reduction of consumption targets for enterprises must be listed in the contents of management responsibility contracts to link up energy conservation and reduction of consumption with economic profits. Also, to implement energy resource allocation, selection, and supply, adopt measures to set time limits for reduction of consumption and penalties for enterprises that consume excessive energy.

3. Greatly promote technological advances. Energy conservation and reduction of consumption interests must be truly foremost in technological reform, and gradually, must link up with achievement of energy conservation technology reform funds with energy conservation quotas. The phase-out of high energy consumption products must be accelerated; the various areas, sectors, and enterprises must strive to spread new effective energy conservation products, new technology, new processes, and materials that effectively conserve energy. Strong measures and strict controls must be adopted on the manufacture and use of high energy consumption products that have been nationally listed for phase-out. The transferring of facilities that have been phased out in the cities to small town enterprises must be prevented. Each year there must be

measures for selecting energy conservation and reduction of consumption projects and technologies that save on investments, have short construction periods, and have good and fast results, and methods for their dissemination must be implemented. At the same time, practical research on development of energy conservation and comprehensive use of resources must be continued, and these efforts must be appropriate to Chinese idiosyncracies, must digest and absorb the world's new technology and processes of the 1980s for energy conservation and reduction of consumption, and make multipurpose use of the 3 industrial wastes.

4. Continue to increase investments. The various sectors and areas, on their own financial strengths, must gradually increase investments in energy conservation and reduction of consumption, or designate specific ratios for special item funds which are to be drawn from energy resources transportation funds, and apply the snowball method, increase investments gradually, and develop many kinds of funding sources. The policy of "fixed quota investments for capital construction projects, clearly marked prices, and no making up for cost overrides" must be firmly upheld, and positiveness in every aspect of the energy conservation effort must be generated.

5. Continue to strengthen the setting up of a legal system, and make sound inspection and checks. In order to systematize energy conservation and comprehensive use, the means must be legalized and regulated, and the legal system for the laws and regulations that already exist must be strengthened, and in the Eighth 5-Year Plan, the drafting of the 'Energy Conservation Law' and the 'Comprehensive Utilization of Resources Law' must be firmed up.

6. Continue to raise energy conservation consciousness. Adopt policies for centralized, dispersed, scheduled and unscheduled propaganda, mobilize the broad masses to further create a tradition for frugal energy conservation, and build the "energy conservation consciousness", "resources consciousness", and environmental consciousness" of all the people.

Energy Sector to Keep Pace With Economic Growth

40100018C Beijing CHINA DAILY (Economics and Business) in English 6 Jan 92 p 2

[Article by Huang Xiang]

[Text] China's top energy official yesterday pledged an increased supply of energy in 1992 to back up the national economic growth.

Minister of Energy Resources Huang Yicheng said the amount of energy the industry turns out this year should be equivalent to 1.057 billion tons of standard coal, up nearly 2 percent from the 1991 target.

"The target is set in line with the central government's planned industrial growth of 7 percent in 1992," Huang said.

The minister made the commitment at the industry's annual working conference which opened in Beijing yesterday.

The six-day meeting was attended by the industry's leading energy officials and experts to hammer out a development strategy for the second year of the Eighth 5-Year Plan period (1991-95).

Of the targeted production, the coal industry is required to produce a record 1.1 billion tons, up from 1.08 billion tons in 1991.

Last year saw the coal sector gradually recovering as the economy started to pick up after a two-year slump.

Huang said coal and electricity supplies will be tight when the national economy picks up further.

The nation depends on coal for 80 percent of its electricity generation. The rest comes largely from the burning of oil, as well as hydropower and nuclear stations.

For the electric power sector, the production target for 1992 is set at 700 billion kilowatt hours.

The industry generated an all-time-high 670 billion kilowatt hours of electricity in 1991. But much of the country still lives in constant fear of blackouts, costing the nation several billion yuan a year in lost output value.

As signs of economic overheating are getting stronger, Huang urged for concerted efforts to raise electricity production "as much as possible to cope with the projected increase in demand."

The industry also plans to pump out 140.5 million tons of crude oil and 15.7 billion cubic metres of natural gas in 1992.

The target for oil production is only slightly higher than in 1991 when the crude output is estimated to have been close to 140 million tons, the level of 1990.

It is widely believed that the oil sector will have to derive the bulk of output growth from its fledging off-shore oilfields.

The industry has for nearly a decade failed to put into operation any new major onshore oilfields, despite encouraging discoveries of large-scale oil deposits in Northwest China's Xinjiang Uygur Autonomous Region.

Also finalized at the meeting will be the industry's construction targets for coal and electricity projects in 1992.

The ministry will put into production eleven coal-mining projects, including mining shafts and open-pit mines. These projects are designed to produce 20.8 million tons of coal a year.

Installation of generating units with 86.2 million kilowatts in total capacity will also be completed in 1992.

Projects to Ease Rural Energy Shortages

40100018B Beijing CHINA DAILY (National) in English 13 Jan 92 p 3

[Article by Wang Dongtai]

[Text] The government has decided to launch energy generating projects in a comprehensive way in 100 counties in China between 1991 and 1995 to solve energy shortage problems.

Officials at ministry level met the county leaders on Saturday in Beijing to discuss concrete plans for the Eighth 5-Year Plan period which started last year.

The State Planning Commission and the Ministry of Finance will invest 4 million yuan ($740,740) in the projects and local governments will invest 14 million yuan ($2.592 million).

The target is to promote the use of energy-saving stoves, methane gas, solar energy, geothermal energy, hydropower, and to replace wood with electricity in the 100 counties.

The projects aim to enable 10 to 20 percent of rural families to use good quality fuel. About 50 percent of rural families in the 100 counties should use fire-wood saving stoves and 90 percent of the coal-stoves sold to farmers should be energy-saving stoves.

In places with abundant solar energy, 30 to 50 percent of poultry farms should use solar energy heating systems, more than 40 percent of newly built houses should use solar energy to heat their rooms and 5 percent of families should use solar energy to heat water.

With the development of electricity networks, electricity should be made available to 90 percent of villages and 85 percent of families in the 100 counties.

The projects were organized by the State Planning Commission, the Ministry of Finance, the Ministry of Agriculture, the Ministry of Water Conservation, the Ministry of Energy, and the Minister of Forestry.

Speaking on Saturday at a meeting held in Beijing, Deputy Agriculture Minister Hong Fuzeng said that in China's rural areas, average per capita energy consumption was only one half of world average.

By the end of the 1980s, rural areas were short of altogether 4 million tons of diesel oil, 20 billion kilowatt-hours of electricity, and 14 million tons of coal.

Ye Qing from the State Planning Commission said throughout the country, 170 million people are living without electricity. Electricity has still not reached 32 counties in China.

Energy shortages have also caused soil erosion, desertification and loss of grassland.

Each year, 400 million tons of firewood and crop stalks were burned as cooking or heating fuel. In the more developed areas and city suburbs, farmers have been demanding new kinds of and better quality fuel.

The projects to be carried out in the 100 counties are intended to find efficient ways to solve energy shortage problems.

During the Sixth 5-Year Plan period (1981-85) and the Seventh 5-Year Plan period (1986-90), various kinds of energy management and production methods were tried in 18 counties.

Those 18 counties successfully demonstrated that it was possible to solve energy shortage problems using local resources such as solar energy, methane gas, hydro power or coal.

Power Industry Plans Use of Foreign Funds

40100014B Beijing BEIJING ZHOUBAO [BEIJING REVIEW] in English Vol 34 No 41, 14-20 Oct 91 p 30

[Text] Liu Huibin, an official from the International Co-operation Department of the Ministry of Energy Resources, recently said, "During the Eighth 5-Year Plan (1991-95), China, in addition to using domestic power equipment and materials, will continue to develop economic and technological co-operation with foreign businessmen who deal in power equipment, use foreign funds and expand power equipment imports. This will speed up development of the power industry."

Liu also said that during the Eighth 5-Year Plan, the power industry will be a key area of development and that the country will adopt the following three methods in its use of foreign funds and import of power equipment.

1. Continue to use preferential loans from the World Bank, the Asian Development Bank, the Japanese Overseas Economic Co-operation Funds and other multilateral and bilateral preferential loans to construct power plants.

Regarding thermal power, China will use foreign capital to build power projects like the Henan Yanshi (2X300,000 kW), the Shandong Zouxian Country (2X600,000 kW), the Tianjin Yangliuqing (2X300,000 kW), the Hubei Ezhou (2X300,000 kW), the Shanxi Hejin (2X300,000 kW), the Jiangxi Jiujiang (2X300,000kW) the Hebei Sanhe (2X300,000 kW) and the Shenzhen Power Plant (2X350,000 kW), as well Shanghai's Yangshupu, Beijing's Gaobeidian and Sichuan's Neijiang.

In regards to hydro-electric power, projects to be built with foreign funds include hydropower stations like the Hainan Island Daguangba Water Conservancy Power project (240,000 kW), the Ertan Hydropower Station (6X550,000 kW), the Hunan Wuqiang Xishui Hydropower Station (5X240,000 kW), the Beijing Ming Tombs Pumping and Energy Conservation Power Station (4X200,000 kW), the Hongshuihe Tianshengqiao Grade A Hydropower Station (4X300,000 kW), and the Zhejiang Tianhuangping Pumping and Energy Conservation Power Station (6X300,000 kW).

In nuclear power, foreign equipment will be imported to construct such projects as Liaoning's 2X1 million kW nuclear power generating unit and a related 500 kv alternating and direct current transformer substation project.

Even as it imports equipment, China will introduce advanced foreign technology and management expertise in the design, equipment manufacture, construction and installation and production operation of power plants.

2. China's power industry will use national and local funds to import power equipment and components, spare parts, instruments and meters, materials and equipment used in production, construction and scientific research which are urgently needed in China. For example, during the Eighth 5-Year Plan, China will import a high-head, small-capacity pumping energy-conservation generating unit, and auxiliary equipment for large thermal power equipment, including subsidiary equipment, heat-control equipment, high pressure valve pipes, etc. In order to raise the level of scientific research, China will also import some advanced instruments and equipment for use in scientific research.

3. During the Eighth 5-Year Plan, China will, using barter trade, import foreign power equipment and continue to import 6 million kW of thermal and nuclear power equipment. Contracts have been signed for the Liaoning Yingkou Power Plant (2X300,000 kW), the Yimin Power Plant (2X500,000 kW), and the Suizhong Power Plant (2X800,000 kW).

The official said that currently, foreign entrepreneurs, including those in financial circles, commodity suppliers, and engineering consultancy companies are concerned with the development of China's power industry. China's industrial power circles warmly invite foreign entrepreneurs to take an active part in co-operating with China in the construction of the following power projects.

—Bilateral and multilateral financial institutions or government agency provision of preferential loans or grants to help China's engineering designing and planning departments with the preliminary work for power projects, particularly hydropower projects.

—Providing long-term, low-interest loans, mixed loans and other financial help for China's large power projects or for newly built technically advanced and renovated projects.

—Taking part in international bidding for the construction of power projects using foreign funds and for contracting or jointly undertaking construction of power projects using foreign capital.

—Competing for the right to provide technical consulting service to power projects, undertaking construction and management of China's imported power projects and providing advice and training for projects as well as consulting services for scientific research projects.

—Engaging in co-operative production with China's contracting companies, engineering consultancy companies and manufacturers.

Sino-Japanese Joint Oil and Gas Exploration in Southern Jiangsu

92P60096A Beijing JINGJI RIBAO [ECONOMIC DAILY] in Chinese 14 Dec 91 p 1

[Article by Xing Guo [5281 0948]

[Text] In order to surmount technical difficulties of carbonate rock oil exploration in Southern Jiangsu Province, the Huadong (East China) Petroleum and Geology Bureau of the Ministry of Geology and Mineral Resources is collaborating with Nippon Oil Company to launch a geophysical survey in Southern Jiangsu, which has China's richest carbonate rock oil and gas reservoirs. The survey will cover an area of 9,600 square kilometers around Wuxi, Changzhou, Zhenjiang, and Nanjing. The team expects to finish data collection from seismic prospecting by 1994.

Quebec Power Delegation Seeking Possible Deals

40100018E Beijing CHINA DAILY (Economics and Business) in English 7 Jan 92 p 2

[Article by Qu Yingpu]

[Text] China has encouraged Canada to compete for a big share in massive hydro-electric power projects to be carried out in China in the next 10 years.

Chinese Deputy Foreign Trade Minister, Tong Zhiguang, told a visiting Canadian power industry delegation yesterday there are many opportunities for further Sino-Canadian economic co-operation.

China is planning to build hydro-electric power stations with a total generating capacity of 45 million kilowatts in the next 10 years. These projects will need both advanced equipment and technology, said Sui Hui, an official with the Ministry of Foreign Economic Relations and Trade (Mofert).

The power industry delegation of Quebec, headed by John Ciaccia, the province's Minister of International Affairs, arrived in Beijing on Sunday for a 10-day visit.

Besides Mofert, the delegation is also expected to meet with top officials with the Ministry of Energy Resources, the State Education Commission and the State Planning Commission. During the visit, the delegation is scheduled to visit Wuhan and Shanghai, said Sui, who is in charge of Sino-Canadian trade.

A group of Quebec companies have already participated in the construction of some power projects in China, including the feasibility studies for the huge project in the Three Gorges on the upper reaches of the Yangtze River.

Sui said she believes Quebec companies will be involved in building more hydro-electric projects in China if the price and quality of their technology and equipment are competitive enough.

Besides economic co-operation, she said, Quebec's trade with China also has "plenty of room for expansion."

Trade between the two sides has surpassed an annual $500 million in recent years, accounting for one-third of Sino-Canadian trade.

China mainly sells garments, cloth, leather, shoes, cotton, electronic products, machinery and synthetic fibre to Quebec while its purchases include the province's minerals, machinery, equipment, steel products, aluminum and aluminum products, plastic products and chemical items.

However, exchanges between Quebec and China only accounted for a small share of Quebec's total foreign trade.

The share in its overall exports in 1990 was only 0.2 percent while that in its imports was 2 percent, according to Quebec's statistics.

A local foreign trade expert said an expansion of trade between the two sides was possible because Quebec, the biggest Canadian province rich in forestry and mineral resources, needs Chinese textiles while its paper, wood and minerals have a big potential market in China.

The expert also noted that more soft loans from Canada will further help a trade expansion between the two sides.

Suggestions on Development of Nuclear Power

926B0002C Beijing ZHONGGUO NENGYUAN [ENERGY OF CHINA] in Chinese No 8, 25 Aug 91 pp 46, 36

[Article by Wang Zhiying [3769 1807 7336], Planning Office, Ministry of Energy]

[Text] France began its major effort in nuclear power development in the 1970's. The French push toward nuclear power was intimately related to the shortage of coal and petroleum resources in France and to industrial development and the material and cultural standard of living. The French experience in many ways can serve as a reference for the situation in China. To this end, we make the following recommendations for China's development of nuclear power.

1. China can benefit from foreign experience in nuclear power development and start at a higher point to avoid wasting efforts. Many advanced countries in the world are developing nuclear power. Today there are 95 million kilowatts of nuclear power generators operating in the United States, 17 million kW in Canada, and 40 million kW in the Soviet Union in 1990. The world total of nuclear power generators exceeds 250 million kW and 130 kW are under construction. Even Taiwan, one of our provinces, has 9.512 million kW of nuclear power. By the end of this century, mainland China will have 6 million kW of nuclear power generators in operation. In terms of China's stature, national power, and actual need, this figure is very small indeed. China should not be satisfied with the construction of 6 million kW of nuclear power and more work should be done to prepare for nuclear power engineering and to lay a sound foundation for China's nuclear power takeoff in the year 2000.

2. Based on China's distribution of energy resources, it should make a major commitment to develop nuclear power. Nuclear power is the fundamental solution for the energy shortage in eastern, northeastern and southwestern China. There are not many sites left in eastern and northeastern China for constructing hydroelectric power stations. Although thermal electric power plants take less investment and a shorter construction time than nuclear power, they require the construction of coal mines and railroads. On the whole, thermal power is not any cheaper than nuclear power. We should make up our mind as soon as possible to develop nuclear power.

3. China now has four major power grids (northeastern, northern, eastern and central China) with a capacity of 12 million kW. Two other grids (northwestern and southwestern) also have capacities beyond 5 million kW. The shortage of electrical power is nationwide and getting more severe by the day, putting a great burden on the power grids. Because of this, we recommend that China start at a higher level and develop large nuclear power units, both fixed output and flexible output power plants.

4. In China's development of nuclear power, equipment and fuel should be domestically made as soon as possible; this is one of the most important lessons in the French experience. We must determine the type of reactors and import the technology as early as possible so that resources may be organized to attack the problems. China can now produce 300,000 kW nuclear power generators and should be developing 600,000 kW generators. Efforts should be made to determine the models and to create the ability to manufacture standardized products. On this basis, larger nuclear power systems can then be produced. Nuclear fuel should also be made domestically so that China can totally shed its dependence on foreign imports and the influence of international politics.

5. In China the development of nuclear power should be centralized and site selection must be done carefully. Once the construction begins, consideration should then be given to expansion and the ease of management. This was another lesson in the French experience that saved a great amount of investment.

6. China should use the French experience as a guide in formulating its own policies based on its actual situation in order to promote the development of the nuclear power industry.

(1) To address the problem of money shortage for developing the nuclear power industry, an electric power construction fee may be collected from new customers and users that have increased their consumption level. In order for the customers to be able to afford the fee, it should be priced according to the average electric power investment of the grid. The insufficient portion may be made up by state investment or low interest loans from banks.

(2) The price of the nuclear power should not be less than the cost so that nuclear power may maintain its production level. Attempts to make windfall profits using nuclear power must be strictly forbidden.

(3) To save nuclear fuel, all nuclear power generators will not participate in peak regulation in the early phase of the development.

(4) During the period of paying off the loan, nuclear power plants will be exempted from paying income taxes and regulation tax.

(5) Nuclear power plants should be open to the entire society. Tours should be organized to promote and disseminate knowledge on the peaceful uses of nuclear energy. For this purpose, showrooms should be incorporated in the design of the nuclear power plants for publicizing the superiority of nuclear power.

Interview With Head of Sichuan's Nuclear Industry Bureau

926B0033A Chengdu SICHUAN RIBAO in Chinese 2 Nov 91 p 2

[Article by Chen Ruzhen [7115 0320 3791]]

[Text] On 17 October this reporter visited the Fourth Conference of the Sichuan Nuclear Society and met Director Zhao Guoguang [6392 0948 0342] of the Sichuan Nuclear Industry. I asked him bluntly: "A lot of the enterprises suffer from low efficiency; can you tell me where the efficiency comes from?" Zhao handed me a stack of research papers from the conference and said with a smile: "You may dig it out from these nuclear treasures!"

Zhao then described to me China's nuclear technology development. Nuclear technology is one of the leading-edge high technologies, he said, and the application of nuclear technology has reached the microscopic material world. The application of nuclear technology can therefore improve the product quality, lead to numerous new products and a series of new industries. It can provide large-scale growth in business efficiency. For example, the matter-energy conversion in nuclear technology, i.e., nuclear energy, can provide the human race with a clean and cheap energy resource. With isotopes and isotope irradiation technology, the property of many materials may be altered. These changes may give new outlooks to industrial and agricultural production, medical research, and environmental protection. After inspecting Sichuan's nuclear industry and technology system, General Secretary Jiang Zemin [3068 3419 3046] had this to say: "In the next 10 years and until the middle of the next century, there will be major breakthroughs in a series of new fields in science and technology. New production technology and new understanding of natural phenomena will change the appearances of some existing industries and become an enormous driving force for progress. We must realize this trend. At the Southwestern Institute of Physics I saw the HL-1 developed and built entirely by us Chinese and heard the description by senior scientists. This experience made me think of many things. Controlled nuclear fusion is a frontier science devoted to the development of new energy resources for humankind; once it is achieved, all the water in the ocean will become an enormous energy reserve that can last 10 billion years. Even though there are some engineering difficulties today, I believe a breakthrough will come someday." These words of General Secretary Jiang explained the great role of nuclear technology in today's and tomorrow's economy.

Based on the information obtained from the Nuclear Technology Society, China is among the advanced nations in nuclear technology application. In China, Sichuan has distinct advantages and has formed a system in nuclear technology that spans research and production. For example, the HL-1 used in nuclear fusion research and China's only high flux engineering test reactor are located in Sichuan. Also in Sichuan are the Southwest Institute of Physics and the China Nuclear Power Design and Research Institute. The fuel elements and components of the 300,000 kW Qinshan Nuclear Power Plant were provided by the Sichuan nuclear industrial units. The design for the Qinshan Phase II 2x600,000 kW nuclear power plant came from the China Nuclear Power Design and Research Institute. The construction of the nuclear power plant will provide for the development of a large number of industries. Realizing the value of nuclear technology, the Erchong Plant beat others in teaming up with Sichuan's nuclear industry system. The joint research and test production produced the A508III steel for a major nuclear power plant component—the pressure vessel. This major achievement has passed certification evaluation and has given the industry a major initiative in future production of pressure vessels for nuclear power plants. If Sichuan is to build nuclear power plants in the future, it not only has the design capability, but can also provide fuel elements.

Finally, Zhao said confidently: "In short, the nuclear technology is a gold mine and involves many facets. In Sichuan alone there are tens of thousands of nuclear technology workers. Several thousand research results have been obtained in recent years. In both nuclear energy (nuclear power) and scientific research, and in isotope irradiation, good progress has been made in industrial, agricultural, medical, resource, environment protection, and scientific research. If the enterprises are interested in better efficiency, they should dig and develop in the nuclear gold mine."

China's Promising Petroleum Base

40100014C Beijing BEIJING ZHOUBAO [BEIJING REVIEW] in English Vol 34 No 47, 25 Nov-1 Dec 91 pp 15-17

[Article by Kou Zhengling]

[Text] "Large Oilfield Recently Discovered in Tarim Basin," "Skilled Oil Workers and Capable Leaders Gather to Develop Turpan-Hami Oilfield" and "Junggar Basin Oilfield Marches Towards Golden Age." All these exciting headlines pinpoint hopes for sustained development of China's petroleum industry.

The Eighth 5-Year Plan (1991-95) for national economic and social development and the 10-Year Development Programme stress the principle of "stabilizing the east and developing the west." They entail a gradual emphasis on the west in the development of the petroleum industry.

In May 1983, more than 400 Chinese and foreign oil prospectors ventured deep into the centre of the Taklimakan Desert and delved into 19 consecutive large trans-desert seismographic sections. They found a group of large and extra-large tectonic formations deep in the vast sea of the desert. This lifted the curtain on China's westward exploration of petroleum. Similar new oilfields and large oil-gas structures have been found in the Tarim Basin, the Turpan-Hami Basin and Junggar Basin since high-yield oil and gas wells were first drilled on a Yakela structure within Kuqa County in September 1984.

The Tarim Basin. Located in the south of the Xinjiang Uygur Autonomous Region, the Tarim Basin has an area of 560,000 square km, 330,000 square km of which are

covered by the Taklimakan Desert. Wang Tao, general director of the China Petroleum-Natural Gas Corp., said, "Geological assessments indicate that reserves of petroleum and gas in this basin can account for one-seventh and one-fourth respectively of China's total oil and gas resources. The prospects for petroleum development are very attractive."

In order to accelerate the exploration of the basin, the China Petroleum-Natural Gas Corp. set up a headquarters here and transferred 19,000 oil workers from various petro-gas bases throughout the country to participate in the campaign. Results obtained after 2 years of efforts included the discovery of four oil-gas fields in Lunnan, Donghetang, Jilake and Sangtamu. A number of high-yield oil-gas wells have been dug around Yingmaili and Tazhong. It has been initially verified that it will be possible to draw on deposits of 5 million tons of crude oil for production during the Eighth 5-Year Plan period.

Lunnan is located north of the basin. The oil-gas bearing scope that has been discovered there reaches 500 square km and the existence has been proven of two rich oil-gas bearing belts. Trial production bases have been built within 30 square km of oil-gas bearing areas. A batch of oil wells put into operation have an initial extraction generation capacity of 1,600 tons of crude oil daily. Petroleum pipelines are being laid between Lunnan and Korla, while it is anticipated that a 600,000-ton crude oil production capacity will be in full swing at the end of the year.

The No. 1 Tazhong structure, located in the centre of the Taklimakan Desert, has a catchment area of 8,200 square km. Halfway through testing, it had yielded 576 cubic metres of crude oil and 340,000 cubic metres of natural gas daily. The oil layer is said to be as thick as 117 metres.

In the area of Jilake, about 70 square km of oil-gas bearing areas have been initially placed under control and three exploratory wells have obtained high yields of oil-gas flows. It is estimated that these will form an annual production capacity of 1 million tons of crude oil.

In Donghetang, the exploratory area is about 500 square km. The No. 1 Donghe exploratory well discovered a 100-metre thick sandstone oil layer that belongs to the Carboniferous system. It probably has the potential to become a high-yield oilfield.

In addition, 23 exploratory wells have obtained industrial oil and gas flows in the split zones between Lunnan and Sangtamu.

The Turpan-Hami Basin. Located east of Xinjiang, it covers 48,000 square km. Numbered among the three sedimentary basins of northwest China, it is one of China's large and medium-sized basins that have undergone primary exploration.

Three large layers of source rock systems from the Permian, Triassic and Jurassic have been verified in the Turpan-Hami Basin since September 1987 and four potential oilfields found in Shanshan, Qiuling, Wenjisang and Yilahu. Of the four, the Qiuling Oilfield has a large area, thick oil strata and substantial deposits. The Shanshan Oilfield, as the first major Jurassic oilfield in China, saw oil gush forth in January 1989 and was formally put into operation in December 1990. The field has produced more than 90,000 tons of crude oil, and the figure will reach 200,000 tons at the end of the year. It is estimated that its annual production capacity of crude oil will stabilize at around 500,000 tons. This April, the No. 1 Wenjisang Well obtained high yields of condensate flow. Experts predict this will be another large oilfield with huge oil and gas deposits. It will probably be connected to the Shanshan Oilfield.

Wu Junyi, an official of the Turpan-Hami Petroleum Exploration Headquarters, said that the future of Turpan-Hami Basin exploration is bright. During the Eighth 5-Year Plan period, the basin will provide an annual 4-million-ton petroleum production capacity. He told this reporter that more and larger areas of reserves remain to be further explored an assessed. At present, drilling work is mainly concentrated in the curved belt in the Shanshan depression in Turpan. It is only one of many such belts. In addition, exploration prospects in Hami appear very good. Most deposits have yet to be found and exploration is in the preliminary stage, so vast potential remains for oil finds.

Wu predicted that in several years the Turpan-Hami Basin will become a national and world-class top-level and large modern oilfield, turning it into a production base for the petroleum industry.

The Junggar Basin. Situated north of Xinjiang, it has an area of 130,000 square km. It is estimated to have 8.9 billion tons of oil reserves.

The Karamay Oilfield on the western boundary of the basin is one of the nation's large oilfields constructed after 1949. It has provided large quantities of petroleum for China's industrial development over the last 36 years. In the past decade, Karamay Oilfield has imported and applied advanced technology and equipment from both China and abroad, and seen continual important exploration finds that have expanded the scope of the oilfield.

Another 12 oil belts have been found in Baikouquan, Fengcheng, Xiazijie and other places. Of these, seven are in operation, while one is being built and tapped. The already drilled 56 exploratory wells have all resulted in oil and reached or exceeded designed production capacity. The crude oil output of the Karamay Oilfield has been on the increase for ten years running. In 1990, it was up to more than 6.8 million tons, becoming China's fourth largest oilfield after those in Daqing, Shengli and Liaohe. This years crude oil output will exceed 7 million tons. Under the Eighth 5-Year Plan, the crude oil output of the Karamay Oilfield will increase to over 8 million tons.

Xie Hong, head of the Karamay Oilfield and director of the Xinjiang Petroleum Administrative Bureau, said that the Karamay Oilfield was only on the edge of the Junggar Basin and had not moved towards its centre. Therefore, proven deposits are limited at present.

Xie continued that the Xinjiang Petroleum Administrative Bureau has worked out an overall plan. It entails a search for large oilfields in the centre of the Junggar Basin, along

with prospecting for mature areas in the northwestern brink and east of the basin. Work must be accomplished on newly added deposits and the discovery of deposit blocks in new areas, while surveys are hastened on the south brink of the basin. The director predicted that petroleum exploration and development in the Junggar Basin will enter a golden age.

Coordinated Development of Energy Industry, National Economy Urged

926B0027A Beijing KEJI RIBAO [SCIENCE AND TECHNOLOGY DAILY] in Chinese 4 Nov 91 p 3

[Article by Zhou Xiaping [0719 0204 1627], Qu Shiyuan [3255 2514 6678], Han Wenke [7281 2429 4430], Su Zhengming [5685 3630 7686], and Rong Tao [2837 3447]

[Text] The energy industry is an important component of China's national economy. Since the 1970's China's energy industry has not been able to keep abreast of national economic development. Not only has electric power been in short supply, but the supply of coal and petroleum has been tight, consequently many factories have not been able to maintain normal production, and the stops and starts have not only cut profits, but have lowered the utilization rate of energy resources. Further, the overdriven operations of the energy industry have resulted in suspension of maintenance and repair on a considerable portion of energy production facilities, and have created an extremely difficult environment for production in the energy industry. The development of the energy industry and the economy are not coordinated, which causes a worsening imbalance in the overall economic development, an irrational economic structure, and makes it very hard for China's economic development to remain in a favorable cycle. For these reasons, research on the coordinated interplay of the energy industry and the national economy has an important practical value toward scientific formulation of plans and policies for the development of the energy industry and the whole national economy.

Analysis of Causes of Uncoordinated Development of China's Energy Resources Industry and the National Economy

The causes of uncoordinated development of China's energy resources industry and the national economy lie mainly in the following areas:

(I) The question of relative speed of development. Analytical calculations have found that the energy industry and the national economy must be developed in harmony, and in order to assure reaching the goal of quadrupling output by the year 2000, the coefficient of elasticity of energy resources should be between 0.60 and 0.70; for electric power it should be about 1.20, and the ratio of the capacity of electric power facilities to consumer facilities should be about 1:2. Since 1983 the speed at which China's economy is developing has been of uppermost interest. In the Sixth 5-Year Plan the annual growth of the national income was 10 percent; the annual growth of consumption of primary energy resources was 4.93 percent; the annual growth of electric power consumption was 6.50 percent; the coefficient of elasticity of energy consumption was 0.49, and for electric power it was 0.65. In the Seventh 5-Year Plan, the annual average growth of the national income was 9.7 percent; growth of consumption of primary energy resources was 6.64 percent; growth of electric power consumption was 9.91 percent; the coefficient of elasticity of consumption of energy resources was 0.68, and for electric power it was 1.02, but the annual average of energy production was only 3.85 percent. Energy resource consumption grew much more rapidly than energy output. In fact, reliance on extraction of coal reserves to support the national economy grew wildly.

(II) The question of investment ratios. Of the fixed capital investments in all of Chinese industry, the proportion of investments that go into the energy industry should be about 20 percent, but in reality, the ratio of investments was much lower than in western countries. Looking at China's energy resources investment situation over the years: 1. Fixed capital investments in the energy industry, overall, were in an upward trend, but the proportion of the whole society's fixed capital investment in general was small, only 14 to 15 percent, insufficient to keep pace with the current speed of development of the national economy. 2. Energy resources investments are seriously affected by overheating of the economy. The adjustment periods that follow each overheating of the economy cause investments in energy resources to drop precipitously, and they do not return to their original level for a long time. That causes too many overdue investment bills in the energy industry, especially in the electric power and coal industries, which in turn lengthens construction periods and makes deficiencies even greater. 3. Investments in the electric power industry are low, which is the main reason there are long periods and wide areas of outage. According to statistical sources from countries around the world, investments in the electric power industry make up 10-15 percent of the total fixed capital investment of the whole society. In China it should be about 10 percent, or 2 to 3 percent of the national income. Except for the first three years of the Seventh 5-Year Plan when electric power industry investment ratio was very nearly 2 percent, national electric power industry investments have been consistently under 2 percent. Excessively low electric power industry investments have not only caused the current strains in supply of electricity, but it will retard development of the energy industry in the future, and the imbalance of supply and demand will become more and more acute. As to the forecasted energy resources development targets at the close of the Eighth 5-Year Plan and Ninth 5-Year Plan period, the following conclusions may obtain: 1. Because of the protracted coal and petroleum industry construction schedules, even if investments are increased immediately, it will be difficult to see any appreciable effect before 1995. 2. Before 2000, China's energy situation will still be very precarious. The findings of calculations show that if the energy investment ratio is scheduled as in the previous few years, supply of electricity, oil, and gas will be short throughout the next 10 years. If the planned 5.4 percent average annual GNP growth rate speeds up, supply and demand for coal may stabilize, but there will be a gap in electric power, oil, and gas.

(III) The question of the balance in the internal structure of the energy industry. Coal is the mainstay of China's energy structure, and that will not change for a long time to come. As to the long-term prospects for oil and gas reserves, although they are fairly optimistic, it will be difficult for the total accumulation of proven reserves of oil and natural gas to satisfy requirements for the development of China's oil and gas industries. China has the richest hydropower resources in the world, but because of their uneven distribution, geological conditions, and the limited investment capability, the degree of development up to now has been very small, only 8.6 percent. Little change is foreseen in the near term. Although nuclear power is making a start, for technological and investment reasons there will be no great advancement in the near future. Therefore, before the year 2000, China's energy resources structure will still be lead by coal, and there will be a coordinated development of coal, electricity, and oil. In recent years, there has been a tendency to steer investments toward electric power, and although it is proper to value electric power, coal and electricity must be developed simultaneously, otherwise it will be comparable to cooking without rice. The average annual investment ratio for coal, oil (gas), electricity is 16:22:52, and that is still considered to be the proper ratio for the internal structure of the energy industry.

(IV) The question of balancing the development and the conservation of energy resources. The energy industry must support the economic development of China, and the policy of "equal importance of development and conservation" must be upheld. From 1980 to 2000, an energy conservation volume of 9.5 million to 2 billion tons of standard coal must be realized, consumption per unit national gross output value must be reduced from 10.34 to 6.11 tons of standard coal/100 million yuan, then the economic development target for the year 2000 can be reached. In the Sixth 5-Year Plan the effectiveness of energy conservation was evidenced by the annual conservation rate of 4.69 percent, but since the Seventh 5-Year Plan the consumption per unit of industrial product not only did not drop, but it rose in some cases. Under such circumstances it would be very difficult for the energy industry to support the achievement of economic targets. The cause of the slide, besides the fact that conservation is getting more and more difficult, is mainly that energy conservation is being neglected, and energy conservation awareness has slackened. Some leaders favor development and treat conservation lightly, they care about speed and not about efficiency, and they are little interested in carrying out energy conservation and reduction of consumption. In order to overcome shortages in energy resources, China is now investing almost everything into development, to the detriment of conservation, and such bad practices lead to shortages—development increases supply—wasteful consumption and demands increase—the vicious cycle of shortages is further propelled. Now is the time to draw attention to energy conservation.

Suggestions and Measures

The key to resolving the lack of coordination between the energy industry and the national economy is in strengthening macroscopic balance and control. In addition to that, energy conservation must be stronger, the internal structure of energy resources must be steadily perfected, and the balance of transportation of coal and transmission of electric power must be improved.

(I) Strengthen macroscopic balance and control

(1) Properly tune proportional relationships. Emphasize research, set down scheduled economic plans, guide businesses and industries in effecting a harmonious development of agriculture and industry. Research has revealed that in the 12 years between 1988 and 2000, China's economic growth rate should be between 5.4 and 6 percent; the growth rate of the energy industry should be 3.18 to 3.79 percent (energy resource exports were not calculated); the coefficient of elasticity of energy resources should be between 0.60 and 0.70, and the coefficient of elasticity of electric power should be about 1.2; within the energy industry, the growth rate for coal should be 3.04 to 3.75 percent, electric power should be 7 to 8 percent, and the ratio of growth rate between coal and electric power should be maintained at 1:2.08 to 1:2.33.

(2) Make sound comprehensive use of the various economic levers. It is advised that the national comprehensive administrative department make a concerted effort to manage a macroscopic balance of prices and comprehensive use of economic levers to control the industrial structure and the general dynamic of the whole country. The energy price structure is too low and taxes are too high, and this degrades the self development capability of the energy industry, and is a factor relating to the causes of shortages in social investments. Expert calculations show that the minimum economically beneficial coal price should be 90 yuan per ton, the price of electricity should be 15 fen per kWh, and crude oil may be determined by the international price level of crude oil. On the current common market, coal actually remains only at about 90 yuan per ton, therefore within 2 or 3 years it may be on a single-track scale. The price of electricity, considered to be in too much economic fluctuation, is seen to be driven by urban domestic life, and electricity for agriculture has for the present not increased in price, or on occasion has increased 2 to 3 fen per kWh, and in about 5 years will gradually settle out. Adjusted crude oil prices may fall to parity with oil or rise above oil; within 3 to 5 years crude oil prices may be on a single-track scale. In respect of tax revenues, there are central financial subsidies, and there is local taxation. To the extent possible, coal, oil, and electric power should be exempt from taxes, and funds marked for construction of transportation for energy resources should actually be used for construction of transportation. Further, the energy industry is funded under concentrated capital industries, and should be given specific preferences for bank credit interest rates.

(II) Adhere to the policy of giving equal importance to development and to conservation.

Experts calculate that in order to achieve a basic balance between supply and demand, during the Eighth 5-Year Plan, the annual volume of energy conservation must reach 37-47 million tons of standard coal, and an annual average energy conservation ratio of about 2.9 to 3.5 percent. It will be very difficult to accomplish that stated mission, therefore the energy conservation consciousness of all the people, and especially the leadership at all levels must be keen, the policy of giving equal importance to conservation and development must be effectively carried out, and the various conservation measures must be put into effect diligently. First, the administration of conservation must be strengthened. There must be effective supervision and monitoring of the conservation laws and regulations already on the books, and timely updating of them or formulation of new laws and regulations, and energy conservation laws must be formulated as quickly as possible, administration and assessments of energy conservation must be strengthened, and an awards policy must be diligently put into effect. Second, put effort into advancing technological progress, make use of advanced S&T for energy conservation and reduction of consumption. Third, continue to carry through national industrial policies, and enterprises that are high consumers of energy resources or major polluters should be forcefully adjusted, and the phenomenon of recent years of adjusting on the one hand, while on the other hand appearing to limit small rustic hearths, small thermal power units, rustic oil refineries, when in fact they increase year by year, must be changed. Fourth, increase investments in energy conservation, make suitable increases in capital construction investments and investments in technological reform for energy conservation. During the Eighth 5-Year Plan, each year, 8-10 percent of the renewal and reform funds should be used for technological reform in energy conservation. That will make it possible to forge a capability for saving 10-13 millions of tons of standard coal each year; and thereby clearly improve the level of energy conservation and reduction of consumption. It is suggested that relevant national sectors strengthen research, and coordination, and as quickly as possible formulate comprehensive and feasible economic policies to promote energy conservation, and pass financial, taxation, and price structures to effectuate economic leverage, strengthen the inherent ability of sectors, areas, and enterprises to conserve energy conservation and reduce consumption, and thereby consciously increase investments in energy conservation.

(III) Steadily perfect the internal structure of energy resources.

A well balanced internal structure of energy resources is essential to a harmonious development of energy resources and the national economy. Because in the foreseeable future coal, will continue to be the mainstay of the internal structure of energy resources, close attention must be given to a coordinated development of coal, electricity, and oil (gas) in the energy industry, and the preferred investment ratio for them would be 24-28:50-54:20-24. Speaking both fundamentally and from the long view, the answer to China's energy resources issue lies in resolving the question of the energy structure and the practical utilization of energy resources.

1. Strengthen prospecting for oil and gas resources, and strive to raise the ratio of petroleum and natural gas in the energy resources supply and demand structure. In 1988 the ratio of petroleum in China's energy production structure was 20.6 percent, in the energy consumption structure it was 17.2 percent. The ratio of petroleum in the energy production structure should be raised to 20-25 percent by the year 2000. In the last 2 years the petroleum industry has been in a state of fluctuation, the main problem being the insufficiency of supply of logistical resources. For this reason, there must be a gradual strengthening of geological prospecting. Before the year 2000, oil and gas prospecting in the east should be expanded, prospecting of offshore oil fields should be intensified, and at the same time the prospecting and development of western oil fields should be fervent. Experts forecast that by the year 2000, proven reserves will more than double, and then the target of raising the ratio of petroleum can be reached, therefore the emphasis in the petroleum industry for the next 10 years will be "increase prospecting and get on with production".

2. Raise the percentage of coal conversion. At present, about 230 million tons of coal are used for heat and power, only about 25 percent of all coal produced. In the next 10 years, great effort should be put into raising the percentage of secondary processing of coal; coal processed and converted for electric power and coking coal should be increased from 30 percent to 47 percent. Attention should also be given to more advanced coal processing; coal that has been screened and washed can raise economic profits by 30 to 50 percent; this assures the quality of coal and the rational utilization of coal; dressed coal can be used for generating electricity, and the gangue can be used for building materials; washing technology can reduce the ash in coal, cut shipping weight and cut environmental pollution. Coal gasification and new liquification technology must be researched as well, efforts should be made to convert coal into gasified and liquified fuels, and the energy end-use structure should be constantly improved.

3. Develop electric power, improve China's energy resources end-use structure. In order to improve as quickly as possible China's energy end-use structure there must be diligent follow-through of the policy laid down by the central authorities, "make electric power be the core", and an earnest effort to raise the ratio of electrical energy in the energy end-use structure.

—Give preference to development of hydropower. China's water resources are very abundant and capable of a power generating capacity of 378 million kW and an annual output of 1.92 trillion kwh of electric power. Development of hydropower should be accelerated and should follow a plan of working from east to west—doing the easiest first and the more difficult later.

—Actively develop coal powered electricity. During the next 10 years the electric power industry must get a foothold in coal and develop pit-mouth power stations,

expand construction of large-sized thermal power networks with 500,000 volt lines as the main carrier, and create conditions for long-range power transmission. As thermal power units are being modelled, small-sized medium- and low-voltage units should be gradually phased out and rebuilt, and large parameter 300,000-kW and 600,000-kW sub-critical and supercritical units should be developed, the heat efficiency of thermal power units should be raised, and environmental pollution should be reduced.

—Strive to develop nuclear power. Nuclear power is recognized in the world as the new energy resource that is advanced, clean, economic and can replace fossil fuels. China now possesses the conditions for developing nuclear power. From a long-range outlook, China's industrial east lacks coal and water, and must develop nuclear power. It is an important means of obtaining electric power. Because nuclear power came late into China, is technologically complex, requires large investments, and because of China's national character and financial situation, generating capacity can only reach 25 to 30 billion kWh by end of century, or about 1 percent of the total output of energy resources, and 2.1 percent of the total generated electric power. After 2000, it should be developed as rapidly as possible.

Inner Mongolia: Another Future Energy Base Targeted

40100014A Beijing BEIJING ZHOUBAO [BEIJING REVIEW] in English Vol 34 No 41, 14-20 Oct 91 pp 12-16

[Article by Cui Lili—first paragraph is BEIJING REVIEW introduction]

[Text] By the end of this century, Inner Mongolia, an autonomous region with a strong traditional animal husbandry industry, will become China's second largest coal producer, only next to Shanxi Province. It will provide energy for the nation's modernization drive.

Inner Mongolia used to be a sweep of grasslands, grazed by cattle and sheep. Now, its vast grasslands are dotted with coal mines, factories and shops. Many people who led a nomadic life before have settled in rural villages or towns and cities.

Nine km south of Hohhot, the capital of Inner Mongolia Autonomous Region, a large oil refinery is being built. Construction of the Hohhot Oil Refinery, the first of its kind in the region, began in July 1989. Inside the factory, which covers 1.2 square km, there are already oil storage tanks and oil refining towers in place as thousands of people finish the last stage of construction.

The factory is expected to go into operation as a key state project during the Eighth 5-Year Plan (1991-95). According to Zhao Guanghua, director of the Department of Investment in Fixed Assets of the Planning Commission of the regional government, after the completion of its first phase of construction in 1992, the refinery will have a capacity to process 1 million tons of crude oil annually from the Arxan Oilfield in the Xilin Gol League. Its products will include gasoline, diesel oil, asphalt and liquefied gas. Its residual oil can be used as raw material by a large chemical works capable of producing 520,000 tons of urea and 300,000 tons of synthetic ammonia annually. Construction of the chemical works, which involves a total investment of 600 million yuan, is expected to be completed by 1994. The Japanese government has granted the chemical project a loan to the tune of 500 million yuan.

Oil, Gas and Coal

Based on the results of geological explorations conducted in the 1980s, Inner Mongolia is known to have 13 oil and natural gas basins totalling 470,000 square km. Oil reserves have been verified to reach 2 to 3 billion tons and natural gas 270 to 1,000 billion cubic metres. In addition to Eren Basin (sketch map) in central Inner Mongolia which has an oil reserve of more than 100 million tons, the Ordos, Hailar, Bayan Hot and Kailu basins in the eastern and western parts of the region are also known to have significant oil and natural gas reserves. According to oil experts, these areas have significant potential and are expected to become China's key oil and natural gas fields in the future.

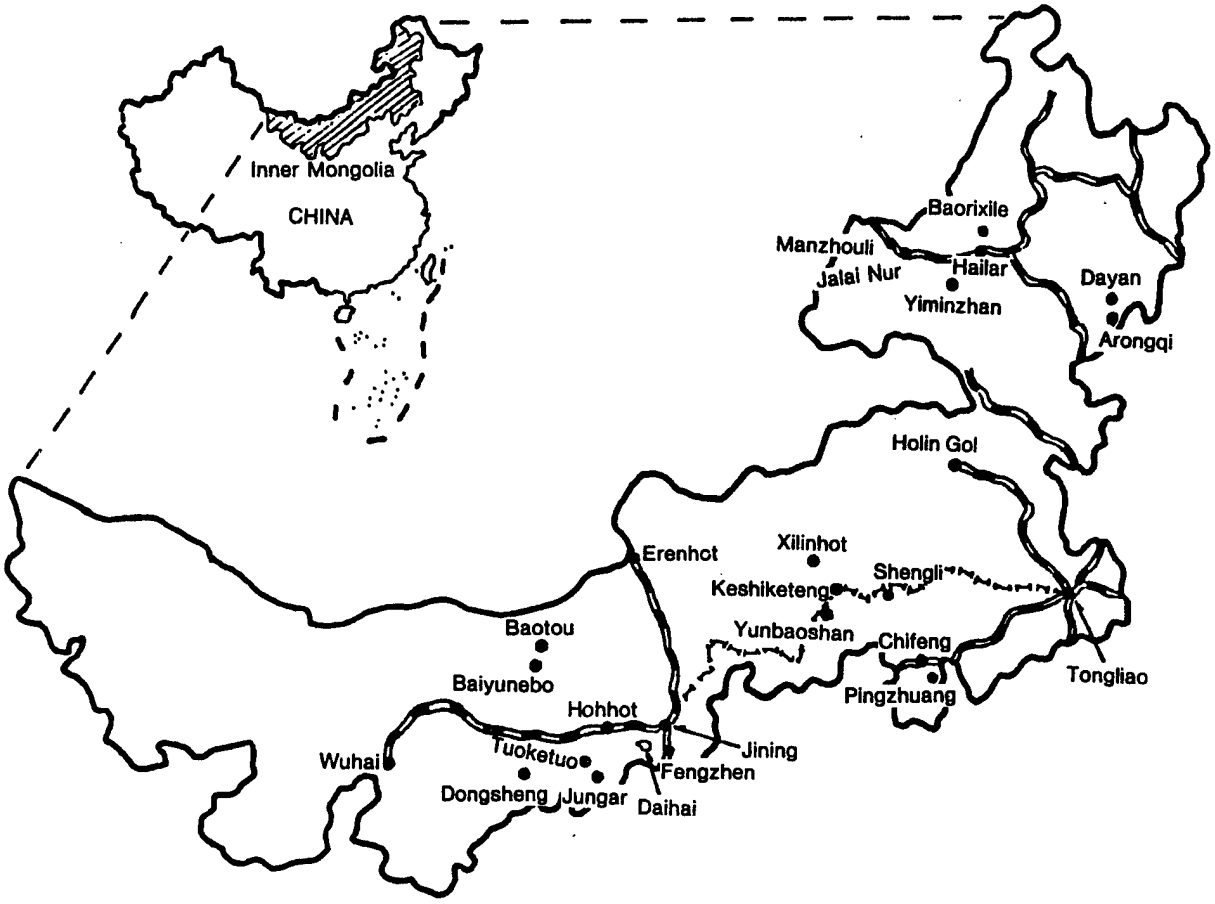
The exploitation of oil and natural gas will bring economic prosperity to the region, a prospect which local officials find quite encouraging.

Coal is another energy resource with even greater potential for exploitation. By the end of 1990, Inner Mongolia had known coal reserves of 230 billion tons, roughly one-third of China's total; the region is expected to have potential coal reserves of 1,000 billion tons, second only to those in the Xinjiang Uygur Autonomous Region in China. More than 200 coal mines are found to have high-grade coal and six of them boast coal reserves of more than 10 billion tons. Four of China's five open-cut coal mines opened in the late 1980s are located in Inner Mongolia. They are in Jungar, Huolinhe, Yiminhe and Yuanbaoshan.

The Jungar Coal Mine, southeast to the Ordos Highlands, Ih Ju League, is still under construction. The coal mine, its coal beds extending tens of km, is located close to the banks of the Yellow River. One coal opening, large enough to hold up to a hundred people, has a coal bed of more than 20 metres.

The Jungar Coal Mine has a total area of 1,365 square km and its coal reserves amount to 26.8 billion tons. Simple in geological features, the coal mine produces low-sulphur coal specially good for power generation. According to Lu Lian, the mine's deputy chief engineer, the mine has a potential production capacity of 50 million tons annually. After the first-phase expansion project is completed in 1993, the mine will produce 15 million tons of coal. At the same time, a 215.6-km railway from Fengzhen (a county in the Ulan Qab League) to Jungar with an annual handling capacity of 15 million tons will also be constructed.

In the 1990s, Inner Mongolia's coal industry will enter a new era of large-scale construction. In addition to Jungar Coal Mine, the Wuda, Haibowan, Pingzhuang, Jalai Nur, Dayan, Yiminhe, Huolinhe, Dongsheng, Baorixile and



Shengli coal mines are all under construction or in preparatory stages of construction (see sketch map). In 1990, the coal output of the region reached 47 million tons. During the Eighth 5-Year Plan, 51 new open-cut coal mines with an annual output of 41 million tons will be constructed and 41 of them with an annual production capacity of 41 million tons, will be put into operation.

In the early years of the next century, construction of seven coal bases for power stations, an export-oriented float coal mine, a coking coal mine and an anthracite mine will be built. Of them, the Dongsheng Float Coal Mine, located on the outskirts of Dongsheng City, capital of Ih Ju League, will produce 15 million tons for export. The coal, low in sulphur and dust and of high caloric value, is of a quality used for power generation. The coal meets or exceeds international standards and thus has great economic value. The Gulaben Anthracite Mine in Arxan, with 380 million tons of reserves, will increase its annual coal output from 600,000 tons to 2.4 million tons, mainly for export.

The annual coal output of the region is expected to reach 79 to 80 million tons in 1995 and 130 million tons by the end of the century. Inner Mongolia will then be the nation's second largest coal producer.

Power Industry

Located in Dalad Banner, Ih Ju League, the Dalad Electric Power Station is a key project during the Eighth 5-Year Plan. After in-depth evaluation, the experts from the Ministry of Energy Resources have concluded that the thermal power station's resources and geographical advantages could make it Asia's largest. The Ministry of Energy Resources has approved a project proposal that the plant have a capacity of 5 billion kw. Construction has already begun and, after completion of the first phase in 1995, the plant will be installed with two 330,000 kw power generators.

According to Sateya, director of the Energy Resources Department of the region's Economic Commission, Inner Mongolia has the resources to develop an extensive power industry. In addition to rich coal resources, the region has a total of 51 billion cubic metres of applicable water resources and one-fifth of China's total wind resources. Also, Inner Mongolia is located at the centre of the northeastern, northern and northwestern China power grids, with vast plains where large plants can be built. An extensive electrical network can easily be connected with the power grids in the three "norths."

According to statistics, the region had a total installed generating capacity of 3.84 million kw by the end of 1990. During the Seventh 5-Year Plan (1986-90), it generated 69.91 billion kwh of electricity. At present, the region has five power stations each with an installed generating capacity of 400,000 kw, including the Yuanbaoshan Power Station in Chifeng City which has a designed generating capacity of 2.1 million kw (600,000 kw per generator), the first station of its kind in China. The region now has two electrical networks serviced by 220 kv transmission lines in its eastern and western parts. They sent 4.835 billion kwh of electricity to north, northeast and northwest China in 1990.

The region's 17 power stations, each with an installed generating capacity over 1 million kw, have a total storage capacity of 35.47 million kw. In the following ten years, the region will concentrate on the construction of large power stations each with an installed generating capacity of 1 million kw including those in Dalad, Fengzhen, Daihai, Yiminhe, Huolinhe and Tuoketuo. By the end of 1995, the region's total installed generating capacity is expected to exceed 5 million kw and three power generating grids will emerge in the region's western, central and eastern parts. By the end of the century, the region's total installed generating capacity will exceed 10 million kw and a unified power grid network will be in place through four 500 kv super-high voltage lines; the network will be connected to power grids in north, northeast and northwest China, making it one of the nation's key electrical power bases.

Rare-Earth Minerals

The Baotou Iron and Steel Complex is one of the eight largest iron and steel companies in China and the largest industrial enterprise in Inner Mongolia. It was renamed the Baotou Rare-earth Metal Co., (but is still referred to as the Baotou Iron and Steel Complex). The company has since multiplied its economic returns, becoming a large, modern comprehensive enterprise group at the foot of Mount Yinshan.

The Baiyunebo Iron Mine, the Baotou company's main supplier of raw materials, has a large mineral deposit of iron, rare-earth and niobium. According to geological explorations, it boasts 72 chemical elements and 142 minerals including 780 million tons of iron ores, the country's largest deposit of niobium and 95 percent of China's total rare-earth reserves—five times greater than the total reserves of other countries.

In the 1980s, the Baotou Iron and Steel Complex became a comprehensive enterprise engaged in rare-earth and niobium mining, smelting, separation, extraction and application. In doing so, it built up the world's largest rare-earth alloy production factory, capable of processing 17,000 tons of high- and medium-grade rare-earth a year. In 1990, the company produced 2.5 million tons of steel and iron respectively, some 1.77 million tons of steel, and one third of the country's total output of rare-earth. Today, the company is the country's largest rare-earth producer.

According to state geological department concerned, Inner Mongolia is a huge pool of minerals. More than 4,100 sites have been discovered with 120 types of mineral ores. More than 600 of them are being mined. In addition to rare-earth and niobium, the region's other mineral deposits include zirconium, berynium, chromium, lead, zinc, the deposits of which are the third largest in China, as well as considerable deposits of heavy and precious metals such as gold, silver, wolfram, manganese, and molybdenum. In 1990, the region's output of gold products placed fifth nationwide. The region also has more than 30 kinds of non-metal mineral ores including the country's second largest reserve of alkali and 200 million tons of salt. In addition, there are deposits of refractory clay and white mica, etc., all of which are required for industry and construction.

Development of the nonferrous metal industry is part of the region's Eighth 5-Year Plan and 10-Year Development Programme; it is expected to be a pillar industry in the regional economy by the end of the century. A work conference on the region's geological exploration and mining industry which was held in April this year clearly indicated that the exploration and development of precious and nonferrous metals would be significant objectives in the near future.

Investment Climate

The Jining-Tongliao Railway is one of the key construction projects invested by both the state and the Inner Mongolian Autonomous Region. The railway, 943 km in length, will cover 13 countries in the region and be managed jointly by the central and regional governments.

After the railway is put into operation in 1994, it will carry more coal from western Inner Mongolia to northeast China, helping ease tense coal supplies there.

In addition, the Transportation Department of the regional government plans to gradually build two key highways over several five-year periods, which connect the region's north and south and the eastern and western parts. They will be integrated into the national highway networks.

To ease telecommunication pressures, the regional government also plans to build a network of long distance communication lines by 1995. These will be equipped with advanced facilities such as optical fibre cables, digital microwaves and satellite ground stations, making it possible to have direct international dialing in league-level cities and direct long distance calls in banner-level cities and towns. By the end of the Eighth 5-Year Plan period, the region will have 662,000 channels of telephones and 3,536 long-distance telephone lines. Programme-controlled telephone exchanges with 150,000 channels will be introduced into the region's key cities of Hohhot, Baotou, Hailar, Lianhe, Tongliao, Chifeng and others.

11 Million KW in Newly Installed Capacity in 1991

926B0042B Beijing RENMIN RIBAO in Chinese 30 Dec 91 p 1

[Article by reporter Fei Weiwei [6316 0251 0251]]

[Text] By midnight of 28 December, an installed capacity of 11 million kW had been put into operation, of which large- and middle-sized units made up 10.0475 million kW. Premier Li Peng made a special phone call to express his heartfelt congratulations.

In 1985, for the first time, China reached a new unit start-up capacity of 5 million kW. In the next 6 years, a pace of 1 million Kw per year was maintained. Now, the annual pace of electric power units going into operation is second only to the U.S.

It is understood that this year's national plan is to bring 37 large- and middle-sized units into operations, for an actual completion of 87 units, among which there are 13 units of over 300,000 kW capacity.

The amount of electric power generated for the whole year could reach 670 billion kWh, a 9 percent increase over last year, exceeding the Seventh 5-Year Plan's annual average level of 6 percent.

Almost 90 Percent of Villages Now Electrified

40100011A Beijing XINHUA in English 9 Dec 91

[Text] Beijing, December 9 (XINHUA)—Millions of farm families in rural China have now benefitted from powerful power grids providing 560 million kWh every day.

A Ministry of Energy official said that China ranks among the leading countries in the world both in the total amount [of] electricity provided and in the scale of the power grids in the countryside.

Statistics show that the total electricity available in the countryside was 20 million kWh in 1949, compared with 205.9 billion kWh at present. By 1990 about 88 percent of rural villages and 95 percent of towns had access to electricity.

The state-run power grids now provide more than 76 percent of the total electricity consumed in the rural areas while the rural power station network, with 58,000 hydropower stations, 900 thermal power plants, 80,000 diesel-driven power stations and 100,000 wind-driven generators, provides 48.2 billion kWh.

Now, about 1 million technicians work in the countryside and 500,000 workers from state-run electrical departments give special service to the rural areas.

Thanks to the development of electricity in the rural areas, TV, refrigerators, and electric fans are commonplace, not to mention electric lighting. In areas with hydropower stations, farmers even cook with electric ovens instead of traditional firewood.

The government has provided 1.5 billion yuan for electricity development in rural areas.

Officials said that in the Eighth Five-Year Plan period (1990-1995), the development of electricity will be focused on rural areas in remote provinces and regions including Qinghai, Xinjiang Uygur and Tibet Autonomous Regions.

Shanghai To Use World Bank Loan for Power Plant Expansion

926B0039C Shanghai WEN HUI BAO in Chinese 21 Nov 91 p 1

[Article by Wei Yang [7279 3142]]

[Text] Shanghai's first power plant to be constructed with a World Bank loan, the Wujing power plant expansion project, a national key engineering project, envisions the installation of two 300,000 kW generating units under a total investment of about 1.2 million yuan. Work on the first unit began on 22 May 1989. It is a trilateral cooperative effort involving the Shanghai Electric Power Construction Bureau, Shanghai Gas and Electric Joint Corporation, and the Northwest Electric Power Design Academy. Over 6,000 engineers installed over 30,000 tons of facilities and made over 20,000 pressure welds, and 99.9 percent of the items inspected were of excellent quality. Once the units begin producing electricity they will relieve Shanghai's electric power crunch. World Bank authorities made many on-site inspections, and regard this engineering project to be a standout among World Bank funded projects in Asia. It has been learned that the second unit is now in stepped-up construction, and it is planned to become operational in September 1992.

Yunnan's Rural Energy Development Reviewed

926B0042A Kunming YUNAN RIBAO in Chinese 27 Nov 91 p 2

[Article by Yu Jiahu [3226 0857 4375]]

[Text] For a variety of reasons the area of forest cover in Yunnan has been reduced to 24 percent. The spread of natural disasters in recent years, worsening pestilence, and devastation of the land is seriously affecting the progress of production and standard of living. The main reason for the harming of the ecological environment is that the forest ecological system has been damaged. According to agricultural resource statistics: the energy consumed by rural villages throughout the province amounts to 15.1 million tons of standard coal, or about 64 percent of all energy consumed in the province, of which the energy used by households is 12.6089 million tons of standard coal, or about 83.5 percent of the total rural consumption of energy, and about 69 percent of that, is firewood. This sort of structure consumes natural resources, and the inevitable outcome is the devastation of forests throughout the province and destruction of the ecological environment. Faced with this situation, the development of resources and conservation of energy efforts were widely promoted, and through arduous efforts over the last 10 years or more there have been notable successes. Looking at energy conservation, by the end of 1990, 1.9756 million rural homes, or 26 percent of all rural households in the province, were using wood- and coal-efficient stoves, for a possible annual savings of 1.7066 million tons of firewood (a value of 102.39

million yuan), equivalent to cutting 2.13 million cubic meters of timber, or protecting 530,000 mu of young trees, and it also saved 343,000 days of wood-cutting labor. As regards development of resources, by the end of 1990, 77,892 rural households were using methane, and total area of solar energy water heaters was 28,846.7 square meters, and other types of solar energy stoves, rooms, greenhouses, etc. were being pushed into service for household use; as were over 1,000 small hydropower generators and 67 wind generators as well. If only wood- and coal-efficient stoves, methane, and solar energy water heaters were made use of, an annual savings of 1.05 million tons of standard coal could be realized, an annual savings of 1.8397 million tons of firewood, which is equivalent to 2.2996 cubic meters of wood, at a cost of 110,000 RMB, and that would create an ecological and environmental gain that is 6 to 8 times the direct economic benefit.

In summary, creation of energy sources for the rural villages has been successful, but it is still not enough. The conversion to wood-efficient stoves affects only a small portion of all rural households in the province. A large volume of low-cost materials being used in rural villages will cause still further reduction of forest cover at a rate of 6 to 9 percent. Although methane is a renewable energy resource, only 11 percent of the rural households that should be encouraged to use it are actually using it. The development of other new energy resources is still only in the testing and modelling stages. The consumption of energy by rural villages is great, the waste is alarming, and because the population is increasing and the economy is developing swiftly, the imbalance of supply and demand of energy resources will continue to worsen daily.

The provincial committee and provincial government are very concerned about protecting forests, and upon summarizing their experiences, they resolved to achieve a balance between consuming and renewing forests, and basically green up Yunnan by the year 2000. Besides the need to strengthen leadership and organization structure and perfect the service system, the following corrective measures should be taken:

1. Convert stoves to save energy. It is anticipated in the Eighth 5-Year Plan, based on the original 1.97 million wood-efficient stoves already in service, that every year 1 million households will convert to wood-efficient stoves, and efforts will be made to complete the conversion of all rural households in the province in 5 years. According to standard calculations, after each household is converted, 1.44 tons of firewood can be saved with obvious results. While promoting the use of wood-efficient stoves, their dissemination and integration must be improved, and besides looking for speed, it is more important to achieve a steady improvement in stove modelling, serialization, and commercialization, in order to raise the rate of consolidation, heating efficiency, and make real use of its energy conservation virtues.

2. Develop methane. During the Eighth 5-Year Plan, positively develop small high-efficiency domestic-use methane pits. Simply stated, one methane using household can save 4 tons of firewood per year and needn't burn any wood at all, and that is the best way to reduce consumption of firewood. In areas where conditions are right, great effort should be put into popularizing the small and highly efficient domestic-use Kunming "meandering distributer" methane pits. Three years ago this pit was demonstrated quite successfully around the province. Its high gas output and easy use was well received by the people. In the Eighth 5-Year Plan, Yunnan wants to build 20,000 pits per year and have a total of 100,000 in 5 years, and it is hoped they will be further improved.

3. Develop other energy sources. In the Eighth 5-Year Plan other energy sources must be actively developed. As regards expanding the use of solar energy, Yunnan is rich in light and heat resources, second only to Xizang, Qinghai, and Nei Monggol. The average annual solar energy per square centimeter is between 90 and 150 kilocalories, and prospects for using solar energy are good and should be actively promoted in rural villages. Domestic-use solar stoves in their many points of design should be demonstrated widely and soon. Utilization of small hydroelectric generators should be expanded; Yunnan is criss-crossed by rivers, rainfall is plentiful, water resources abundant, second only to Xizang and Sichuan, and rural villages possess very good potential for development of small hydroelectric generators. In recent years, demonstration of small hydroelectric generators has been successful, and at Dali, Zhaotong, etc., they are in wide use and quite well accepted by the people. They are convenient to use and all that is needed to install the equipment is free running water.

4. As concerns small wind generators, the annual average wind velocity in Yunnan is between .5 and 5.9 meters per second, in the southwest it is somewhat less, in the northeast, central and northwest areas it is a little stronger, and the windiest point in the province is generally 15 to 25 meters per second. The use of small wind generators in such places as Nei Monggol is very widespread. Yunnan has not had much experience with wind generators and they could be tested further in places where the winds are good. Once experience is gained there use could be expanded. As far as small animal driven generators are concerned, there is one test generator in Chuxiong Autonomous Zhou.

If the above approaches are taken, the problem of supplying energy to rural villages in Yunnan will gradually be worked out, the forests can be protected, and that will benefit the economy and the society.

Guizhou's Electric Power Development Targets Detailed

926B0021A Guiyang GUIZHOU RIBAO in Chinese 23 Sep 91 p 4

[Article by Yuan Changlong [5913 2490 7127]]

Guizhou is a province rich in energy resources, and is distinguished among the southern provinces for having the advantage of developing both water and coal simultaneously for electric power. In the "Guizhou Province 10-Year National Economic and Social Development Plan and Eighth 5-Year Plan" it is stated that Guizhou will further maximize its advantages in energy resources to establish Guizhou in the 1990's as the energy base of the south. Guizhou will study the

electric power targets and relevant policies defined in the Eighth 5-Year Plan to expedite electric power development, and make it one of the prime building blocks in the strategy for Guizhou's economic development.

I

[passage omitted] Statistics show that in the Seventh 5-Year Plan the Guizhou Electric Power Bureau made investments of 1.47 billion yuan for large- and medium-sized electric power capital construction, an amount 4.8 times that of the Sixth 5-Year Plan. In addition to the Qingdian third-phase expansion project (400,000 kW) which was completed and is now operational, there were the electric power projects that were carried over into the Eighth 5-Year Plan, which totalled 1.435 million kW, (of which hydropower was 585,000 kW and thermal power was 850,000 kW), and the 500 kilovolt extra-high voltage power line project from Tianshengqiao to Guiyang.

In order to meet Guizhou's economic development needs and the national demands for Guizhou's electric power, the pace of electric power construction and transformation in Guizhou must be accelerated, and at the same time, in consideration of the electric power projects that will link up with the Ninth 5-Year Plan, the early stages of electric power construction of the Eighth 5-Year Plan must be fervid. The targets for Guizhou's Eighth 5-Year Plan are: In construction for electric power: the Zuni power plant expansion project, in two steps (2 X 125,000 kW), will be completed and operating in 1991 and 1992; the first unit of the Dongfeng hydropower station (3 X 170,000 kW) will be completed and operating in 1993, and the project will be completely finished in 1994; the Panxian power plant (3 X 200,000 kW) will be sequentially completed and in operation in 1993, 1994, and 1995; the 500 kilovolt Tian-Gui power transmission line will be finished in 1991 and will begin transmitting in 1992; the technological transformation of the Guiyang power plant (the dismantling and rebuilding of an old 75,000 kW unit into a 200,000 kW unit) will begin in 1992 and will be completed and operational in 1995; the technological transformation of the Duyun power plant (2 X 300,000 kW) will begin in 1992 and the first unit will be operating in 1995.

In the production of electric power: by 1995 the installed electric generating capacity in the Guizhou electric power system will be over 3.5 million kW (including the Guizhou share of the capacity of the Tianshengqiao second-cascade station); the annual power output will be 16 billion kWh, that is, by 1990, the annual average increase was 12 percent; standard coal consumed for electricity supplied was 418 grams per kWh, including units of 125,000 kW and up, which were 395 grams per kWh; the line-loss rate was 7.8 percent; the factory-use rate was 9.9 percent. As to the matter of safety, great strides were made in eliminating damaging accidents at facilities, accidents causing network breakdowns and wide areas of outage, and accidents causing injury and death, and fire disasters.

II

To realize the above stated targets, the electric power departments should do the following:

— Shorten construction periods, ensure quality, and realistically speed up the rate of construction progress. According to forecasted progression of electric power volume levels and loads, Guizhou's power shortages will extend into the middle of the Eighth 5-Year Plan. Accelerating electric power construction is the best means of dealing with the power shortage. The key electric power projects coming on line soon, from the outlay of funds, deployment of engineering forces, and supply of materials should get priority guarantees, and all obstacles to engineering and construction should be absolutely gotten rid of; and in the administration of projects the letting of bids should be enforced, the exercise of quality veto rights should be upheld, new engineering processes, new technology should be positively utilized, and construction schedules should be shortened by all means possible.

— The technological transformation of electric power facilities should be realistic. The total capacity of single units of the medium-temperature, medium-pressure, 6 to 65,000 kW type units in the Guizhou electric power system is 870,000 kW. They have been in operation for 20 years or more beyond their life expectancy; the facilities are antiquated and worn out; their energy consumption is high; and there is considerable environmental pollution. If technological transformation is properly scheduled, and small units are replaced by large ones, and existing sites and manpower are used, there could be increased production and a reduction in consumption, and a favorable environmental impact. Conditions are good for the technological transformation of old thermoelectric power plants such as the Guiyang and Duyun plants, and with a good measure of effort in the early phases, at least two projects should start operations in the Eighth 5-Year Plan. The technical transformation of the electric power grids must center around improving the main power lines, expanding the areas of coverage and power supply capability, and sustained power and high current levels should be assured.

— Strengthen in-service operational maintenance of facilities, and make full use of equipment capabilities. All power supply enterprises must take action against weak administrative links through adjusting controls, enlightened production goals, and keeping the facilities in better condition; that must begin with education and technical training with strict requirements to realistically raise the political quality of the staff and worker units, adjust operational discipline, enhance operations, and upgrade the quality of work.

— Thoroughly carry out the Ministry of Energy Resources' "Operational Safety Directive No 1". The provincial electric power bureau and subordinate production and capital construction enterprises must all get involved in the administration of safety targets, and the fulfillment of safety responsibilities at every level; all primary leadership levels must schedule operational-safety analytical conferences, and disseminate and conduct surveillance of electric power safety measures and

accident prevention measures. Enhance safety education and awareness, make assessments, and rigidly inculcate the concept of "safety first" among the staffs and workers.

— Perfect the management contract responsibility system within electric power enterprises, and raise the profits and labor production rate of those enterprises. Based on the summation of the advantages and disadvantages, losses and gains of management contracts that were engendered in the Seventh 5-Year Plan, the national, enterprise, and individual staff and worker relationships that proved to be beneficial should be supported, overcome the "take it or leave it" phenomenon, make enterprises look within themselves, strengthen controls, and uncover their potentialities.

III

The realization of Guizhou's electric power targets in the Eighth 5-Year Plan will be determined to a large extent by external circumstances, by policies, and by objective conditions. The external problems that should be resolved are as follows:

1. Intensify reforms. Stabilize and perfect a policy for raising funds to manage electricity. According to the schedule of the Eighth 5-Year Plan, the investments for Guizhou electric power capital construction and technological change should be 3 billion yuan. First, there must be an increase in national investment in Guizhou's electric power. This is basically because of the conditions for development of electric power in Guizhou, the requirements of neighboring provinces for electric power, and national requirements for development of raw materials industries in Guizhou. Concrete measures must be enacted to see that the national investments amount to two-thirds to over one-half of the total investment. Second, there should be jointly constructed factories, rights to use electricity should be sold, and there should be measures passed to broaden the scale of joint efforts among provinces to manage electricity. Recently the State Planning Commission and the Ministry of Energy Resources conceived of the idea that Guizhou should transmit power to central China, and the opportunity must be seized to include two to three cooperative electric power projects with central China in the Eighth 5-Year Plan. Third, the policy for raising funds within the province for electricity should be firmed up; in addition to provisions for the provincial government to raise electric power construction funds, financial arrangements should be made at all local levels for investing in electric power, the new enterprises that use electricity should be required to buy electric power bonds and rights for the use of electricity, rational prices for electricity should be calculated, the capability of new on-line electric power projects to make repayment should be guaranteed. Fourth, there should be provisions for unified management for development of electric power for high energy consumption products (such as aluminum, phosphorus, and ferroalloys), and there should be foreign funds for electric power, and bonds for high energy consumption products should be prohibited.

2. Seize the opportunity to open up a succession of key hydropower and thermoelectric projects. Under the principle of a unified plan for electric power development, fully apply national preferential policies to set up progression of development projects. For hydropower, the State has authorized Guizhou to establish the Wu Jiang Hydropower Development Corporation, and based on the already built Wujiangdu power station and the Dongfeng station now under construction, a special priority policy was granted to hasten the raising of funds by enterprises to give impetus to the Wu Jiang watershed cascade hydropower development. There should be an effort to get the Hongjiadu and Goupitan hydropower projects started in the Guizhou Eighth 5-Year Plan. For thermoelectric power, there must be an earnest enforcement of the State Council's policy for combined management of coal and electricity, funds should be raised, the early phases of the Pan-Nan coal and electricity unified management projects should get underway, and the proper conditions should be created to get on with at least one project in the Eighth 5-Year Plan.

3. There must be a logical administrative structure for electric power, and the extension of grids should be stepped up. There are still 35 counties in Guizhou that are not served by power grids, and the economic development of those areas is inhibited by shortage of electricity. The goal is to eliminate electricity-deprived counties by the year 2000 by extending mainly the 110 kilovolt grids. But, since the Seventh 5-Year Plan, national funds for such projects have been turned off, and they must be supported by local funds. To do this, three approaches must be taken: First, plan for development of an all-province 110 kv grid as soon as possible, construction will be apportioned and arranged according to the economic situation of each area; second, arrangements should be made according to availability of energy resource funds. Before grids are extended, and small hydropower and thermoelectric are built, projects should be fully validated and prioritized. As far as possible, use small investments to solve electricity problems in the outlying areas; third, there should be a tax of 2 to 3 li for every kWh of electricity sold, and special funding should be set up for grid development. Every level of local government must support electric power departments in their function of providing good industrial administration, and non compliance with national energy resource policy, duplication of construction in any location, and projects wasteful of investments and resources should be rigidly guarded against. In order to get the best social gains from electric power, government, legal, economic, and technical measures should take the "three power" approach (planned use of electricity, conservative use of electricity, and safe use of electricity). In the allocation of electric power, priority should be given to guaranteed high-output value, efficiency, product output that suitably meets needs, and electric power leverage should be used to assist in adjusting the Guizhou production structure. Energy conservation technology and energy saving products should be

widely promoted, and the rate of consumption of electric power for manufacture of products should be reduced year by year.

Another Power Crunch in Zhejiang Province

926B0039A Beijing JINGJI RIBAO in Chinese 7 Dec 91 p 1

[Article by reporter Xie Ranhao [6200 3544 3185]]

[Text] On a recent news-gathering trip to Zhejiang it was found that the prevailing sentiment was that Zhejiang is in another electric power crunch.

The situation as described by the Zhejiang Province Electric Power Industry Bureau confirmed this sentiment. The daily electricity requirements for the entire province are between 67 and 68 million kWh, but the most that the provincial electric power department can supply is between 52 and 54 million kWh, a daily shortage of 14 million kWh. Since September, the number of times that Zhejiang has restricted power line distribution has increased two-fold; up to September distribution was restricted more than 600 line-times, two-thirds of which were in September, and that number continued to climb into October and November; on all urban power lines restrictions were applied as many as 10,000 times, pitching enterprises back into the former three stops and four starts predicament, which had not been in evidence in the past couple of years.

The deputy chief of the Zhejiang Electric Power Industry Bureau, Chen Jimin [7115 4480 3046], told reporters at the news conference that there are three causes for the growing imbalance of electric power in Zhejiang: One is that the rate of industrial growth is too fast, far exceeding the growth rate of electric power; up to October, the rate of industrial growth was about 3 percent. Another cause is the abnormal weather and lower water levels which have caused many hydropower stations to shut down. This summer in the east China area there were major disastrous floods, and throughout Zhejiang, except in the Hangjia Lake area, there was a long period of drought, making it impossible for over one-fourth of all types of hydropower stations to operate. Third was because continual slowing down the supply of electricity for more than a year dimmed the hopes for planned use of electricity for a large number of enterprises and departments, and caused the scramble for electricity at peak times to increase, intensifying the electric power crunch. The reason that the current electric power crunch throughout Zhejiang has not reached the dimensions of the widespread stoppages of 1988 and 1989 is because of the many times that restrictions on the use of power have been applied.

Chief Chen Jimin explained further that at the time of the critical outage of 1988-89 it was coal that was in short supply, but what is lacking now is the capacity of power generating facilities. He feels that the measures needed to alleviate the present power shortage in Zhejiang are, one, cool down the torrid pace of industrial growth, and two, tighten up discipline on the use of energy by planned use of electricity.

Trial Operation for Jiaozuo No 5 Unit

926B0039B Zhengzhou HENAN RIBAO in Chinese 18 Oct 91 p 1

[Article by Lian Kui [6647 7608], Rui Sheng [3843 3932], and Liu Ping [0491 1627]]

[Text] The 200,000 kW No 5 unit of the Jiaozuo power plant, after two test runs of 72 and 24 hours, formally went into test operation on 12 October. This power plant has five 200,000 kW units in operation, and it is the second 1 million kW thermoelectric power plant, after the Jiyaomeng power plant, in Henan Province.

Construction was begun on the No 5 unit on 20 December 1989, the previous four units having been installed between 1979 and 1986. Up to September of this year they had generated 44 billion kWh for an output value of 2.65 billion yuan, or 1.9 times the national investment. The five 200,000 kW units are totally Chinese designed, manufactured, and installed. They will alleviate the imbalance of supply and demand for electric power, and will be a great help in stimulating Henan's economic development.

State Plans To Build Ten Additional Medium Power Stations on Upper Reaches of the Huang He

926B0030A Beijing RENMIN RIBAO OVERSEAS EDITION in Chinese 20 Nov 91 p 3

[Article by Wang Jianping [3769 0256 1627]: "China Attaches Importance to Developing Huang He Hydroelectric Power, Plans To Build 10 New Power Stations on Upper Reaches of River"]

[Text] China is planning a cascade of 10 more medium-size hydroelectric power stations on the upper reaches of the Huang He, which will bring the total number of projected power stations there to 25. Experts estimate that when the 10 additional stations are completed, the total installed generating capacity on this section of the river will reach 15.222 million kW and the rated annual output will reach 55.734 billion kWh.

Between Longyangxia and Qingtongxia, the Huang He flows a distance of 918 kilometers through Qinghai, Gansu, and Ningxia provinces, with a natural drop of 1,324 meters. The river rushes through precipitous, narrow gorges, the drops in elevation are grouped close together, and the flow is plentiful and consistent; but there are also open, broad level areas that make excellent natural collecting basins. Thus the hydropower generating conditions are excellent.

Experts state that the 10 additional stations should provide an additional installed generating capacity of 1.526 million kW with an annual output of [5.734 billion] kWh.

As a result of more than 30 years' construction activity, five stations have been completed and have begun producing electricity at Yanguoxia, Qingtongxia, Liujiaxia, Bapanxia, and Longyangxia, with a total installed generating capacity of 3.244 million kW and a rated annual capacity of 15.75 billion kWh. This October, the river was blocked at the site of the Lijiaxia station, with a planned capacity of 2 million kWh, and large-scale construction activity was begun; construction was also formally begun on the Daxia station this October. In the next 10 years, China will also focus on developing hydroelectric power stations at Laxiwa, Gongboxia, Jishixia, Xiaoxia, and Wujinxia. The Laxiwa station will have an installed capacity of 3.72 million kW and a rated annual output of 9.74 billion kWh, making it the largest hydroelectric station on the upper Huang He.

River Successfully Blocked at Lijiaxia Site

926B0030B Xining QINGHAI RIBAO in Chinese 14 Oct 91 p 1

[Article by Jun Zhe [0193 0772] and Liu Shi [0491 4258]: "River Successfully Blocked at Lijiaxia Power Plant Site"]

[Excerpts] The river was successfully blocked at the Lijiaxia power plant site at 11 AM on 13 October. A sand and gravel embankment was successfully run across the 53-meter breadth of the river from right to left. The eastward-flowing waters were diverted into a 1-km long manmade tunnel on the right bank, from which they then continued downstream. [passage omitted]

With the Yellow River successfully blocked at the Lijiaxia hydroelectric station site, the main work of pouring concrete for the dam and the power station building can be begun, thus supporting the policy of striving to have the power plant generating electricity by 1995.

Since the 1987 beginning of construction on this key state project, which will have an installed capacity of 2 million kW and a rated annual output of 6 billion kWh, a succession of difficulties have been overcome, including insufficient investment for even a third of a reasonable construction period, extremely complex geological conditions, flooding, and mud and rock flows; the diversion tunnel was ready at the end of last year, running in power, water and roads, and grading the site, a necessary phase in preparing any work site, were largely completed, the left and right shoulders of the dam were cut into the slopes, materials assembly and rock barrier blasting tests were completed, and inhabitants were relocated, so that everything was in readiness for blocking the river. A leadership group for the river-blocking operation was then created and the plans for the operation were laid out. The Lijiaxia headquarters of the No. 4 Hydroelectric Administration, which was in charge of blocking the river, organized a breakthrough brigade and prepared 25,000 cubic meters of sand-and-gravel fill and stone blocks, 750 reinforcing-bar cages, fifty 15- and 20-ton cement tetrahedrons, and 45 large trucks, loading machines, bulldozers and flatbeds.

The rock barriers at the entrance and exit of the diversion tunnel were successfully blasted away on 8 and 10 October, and the first partial diversion of the river channeled 40 percent of the flow into the tunnel. On the morning of 11 October, with sand and rock being dumped at a rate of a truckload per minute, the river blocking operation was begun. On the morning of 13 October the blocking of the river was completed. [passage omitted]

Fengman Hydropower Station Second-Phase Construction Completed

92P60105A Beijing RENMIN RIBAO OVERSEAS EDITION in Chinese 20 Dec 91 p 1

[Text] The second-phase construction of Fengman hydropower station has been completed. On 18 December the first 85,000 KW generator was officially put into operation and joined the northeastern grid. The generator had been tested for 72 hours before becoming operational. According to the State Acceptance Committee's report, the operation went well, and all data met the design requirements.

Shenhai Plant Completed, Generating Power

92P60101 Beijing JINGJI RIBAO [ECONOMIC DAILY] in Chinese 27 Dec 91 p 1

[Text] The Shenhai thermal power plant, a major energy project under the State's Seventh 5-Year Plan, was completed on 26 December. The plant, located in Shenyang City, cost 1 billion yuan and its installed capacity of 400MW will generate some 2.45 million kilowatt-hours of electricity a year and provide heat for about 8 million square meters of [building] space. Following the plant's going on stream, Shenyang's energy shortage began to ease immediately; the area being heated throughout the city rose to 10 million square meters and the quality of the environment will improve as many heating boilers and their smokestacks have been eliminated.

Jiangyou Power Plant Expansion Project Update

92P60109 Chengdu SICHUAN RIBAO in Chinese 2 Dec 91 p 1

[Article by Wu Zhongfu [0702 0022 4395]: "Jiangyou Power Plant's No. 8 Generatfor Joins Grid"]

[Summary] The 330MW No. 8 generator of the 1.19 billion yuan Jiangyou plant expansion project joined the grid on 28 November 1991. The expansion of the Jiangyou plant will add 4 billion kWh a year to Sichuan's electricity supply and boost the province's production value by 16 billion yuan. The No. 8 generator was the second of two 330MW units added in the expansion project.

Supply and Demand Situation To Remain Unchanged in 1992

926B0041A Shanghai JIEFANG RIBAO in Chinese 28 Dec 91 p 5

[Article by reporter Shi Zhixing [2457 1907 5281]]

[Text] According to information from the national unified distribution coal ordering conference, next year's total coal production plan is 1.1 billion tons, of which unified distribution from coal mines is set at about 490 million tons, electric power generation volume will be 700 billion kWh (5 percent more than this year), and the crude oil production plan is to be a little more than this year. Looking at what coal mines will be able to supply for centralized distribution of resources next year shows that the coal supply and demand situation for the whole country will be basically unchanged, but because of transportation limitations, the east will be deficient in coal, and the phenomenon of having a coal glut in the west will be difficult to change. The supply of types of coal will be unbalanced, mainly in that the supply of coking coal and power-generating coal will be insufficient.

This year national industrial output has increased overall, and between January and October, the growth rate was 13.9 percent. The energy industry also grew steadily, but the production of coal was affected by unfavorable market sales, and it is estimated that this year there will only be 1.08 billion tons, about at last year's level. Looking at the coal supply situation, because coal mines, railroad, and transportation entities all pitched in, national coal storage surpassed 200 million tons. Between January and November, the amount of electricity output increased by 9.28 percent over last year, crude oil output, estimated for the whole year, finished out at 137 million tons.

For the 1992 energy industry development to satisfy the needs of national economic development, next year's coal production plan will be set at 1.1 billion tons. According to various units' declared resources, next year unified energy supply can be raised to 587 million tons, up by 52 million tons compared with this year, but after matching this against railroad capacity, unified distribution of resources cannot be increased very much over this year. At present, because coal production is very good, there are plenty of stockpiles; coal for electric power storage is 10 million tons, and market coal stockpiles are more than 40 million tons, so this year, coal market prices are relatively steady, and there is even some reduction. This year and next year, China will continue to put new coal mines into operation, and new production capability will be created. For this reason, next year's coal resources supply picture is fairly good. In some areas, for a period, coal supply will be retarded.

Because of the progressive development of production, the imbalance of supply and demand of coal will still exist next year: 1. the areas of increased production of coal are uneven: there is an overproduction of resources in the west, but because of the weakness of eastern coal fields, resources are seriously insufficient. 2. Because of transportation limitations, western coal cannot be shipped out. The east lacks coal, the west is glutted with it, and next year that will still be the case. The supply of types of coal is out of balance, mainly coking coal and high quality power-generating coal are in short supply, and in the northeast there is an increased amount of lignite.

Next year the newly increased allocation will not satisfy needs, and various businesses and industries, except for part of the coal that is stockpiled, must still exercise conservation measures. The energy utilization rate in China is too low, and energy consumption is 3 to 5 times higher than in industrially developed countries. Energy users must adopt strong conservation measures and raise the utilization rate of coal.

XINHUA Stresses Clean Development, Exploitation of Coal

40100011B Beijing XINHUA Domestic Service in Chinese 8 Dec 91

[Commentary: "It Is Necessary To Pay Great Attention to Clean Development and Exploitation of Coal"; by XINHUA reporter Yang Zhaobo [2799 0340 3134] and trainee Lang Guohua [6745 0948 5478]]

[Text] Beijing, 8 December (XINHUA)—Coal constitutes 75.6 percent of China's energy resources, a much higher percentage than the world average, which is 28 percent. Because of our poor technology and other backward conditions, pollution in coal consumption is serious and large amounts of carbon dioxide are exhausted. Various inspections and tests show that atmospheric smoke pollution has become a condition for developing cities in Northern China and industrial areas throughout China.

At present, more than 90 percent of China's coal is still burning directly. As a result, our heat efficiency of coal has not been markedly raised, while our coal consumption is rising at high speed each year. Atmosphere over some industrial cities still contains large amount of bisulfides and dioxides. According to experts' preliminary forecast, in 2030-2050, coal demands by our country will remain more than 50 percent as a direct energy resource. If we fail to make any remarkable breakthrough in clean exploitation of coal, our environmental pollution will worsen to an unbearable point.

Experts, deeply worried about the situation and prospects, point out that China's current situation in exploitation energy resources must improve and as soon as possible a long-range plan on the technology of clean development and exploitation of coal must be drawn up that suits our national conditions. It is necessary to conduct an overall study on the estimates of coal resources, coal production, processing, exploitation, and pollution control. It is particularly necessary to stress coal washing, dressing, and processing. We should strive to reduce end uses of coal, such as direct burning and separate burning, and increase proportional use of electric power, heat, gas, and other clean, highly efficient indirect energy resources derived from coal.

Today, it is necessary to build China's coal dressing technology system in accordance with the varieties of coal,

the characteristics of our coal quality, and our market demand. It is particularly necessary to conduct research on the advanced technology of desulfurization before coal burning, and the new technology of coal for industrial and residential uses.

Experts have made a few suggestions which merit our reference and adoption:

1. Study and disseminate fluidized-bed boiler technology. Because this new technology can increase the burning efficiency of coal to more than 99 percent, sulfur contained in coal is adsorbed by limestone in the course of burning, and the temperature while it is burning is lower than the formation point of nitrogen and oxygen compounds, thereby greatly reducing the discharge of contaminated substance in smoke.

2. China should make great efforts to develop the new technology of coal gasification and liquefaction, achieve the domestication of its equipment production as soon as possible, greatly reduce the atmospheric pollution in coal consumption, and alleviate transport stress. In addition, it is necessary to develop gas combined cyclic electricity generating, a method which can increase the efficiency of power supply to 38 percent to 43 percent and an internationally acknowledged technology orientation for thermal power plants.

3. In coal-rich and oil-hungry areas, we can build complexes capable of producing methanol or mixed alcohol or co-producing gas for urban consumption. In Shanxi, a province which abounds with coking coal resources, we can build coking coal refining—chemical industry bases. In Wuda mining district, Inner Mongolia, where coal, electricity, water and limestone resources abound, we can build large calcium carbide industry bases.

4. Thermal power plants are the biggest sources of atmospheric pollution. In addition to developing power generating technology which discharges less pollution, we must also study the technology of purifying smoke. At present, the technology of desulfurization and dust elimination has ripened, and the technology of denitrification has also been commercialized; however, their costs are very high. We should proceed from China's specific conditions and actively study the development of an economical and effective smoke-purifying technology.

Experts also pointed out: While we persist in developing and conserving energy resources at the same time, we must make efforts to control the total amount of coal directly exploited as fuel. We must strive to advocate energy-conserving production and lifestyle and by using our scientific and technological achievements to promote revolution in energy resources technology, reach higher production efficiency and living standards on a lower energy-consuming basis. We must readjust the composition of our energy resources, speed up the development of natural gas and hydropower stations, actively develop nuclear energy, and increase the proportion of energy resources cleanly developed and exploited directly from coal.

Ningxia's Coal Industry Continues To Grow

926B0041B Yinchuan NINGXIA RIBAO in Chinese 26 Nov 91 p 1

[Article by reporter Yu Xiaolong [0060 1420 7893] and correspondent Yang Zheng [2799 6774]]

[Text] Ningxia's coal industry has entered a new development period. Soon construction will be completed or be getting underway on the Shizuishan Mining Bureau's No 3 shaft and 12 other major projects, the total investment for construction has reached over 1.1 billion yuan, or about 81 percent of the total investments in the coal industry of the region over the last 30 or more years. It is estimated that when these projects are finished, the production capability for unified distribution from coal mines in the Eighth 5-Year Plan will increase by 300 million yuan.

Ningxia's coal industry has experienced a high tide of construction in the Shizuishan and Shitanjing mining districts, has completed a number of capital construction projects and associated full-scale installations, and has taken the first steps in forming a rather complete coal industry system. The development and construction of the Lingwu mining district again ushered in a third rush of construction activity in Ningxia's coal industry. Projects soon to be completed and become operational are the Shizuishan Mining Bureau's No 3 shaft and porcelain factory; the No 2 shaft of the Lingwu Mining Bureau's Lingxin mine and Yangchangwan No 1 shaft; and the technological conversion of the No 1 plant of the Northwest Coal Machinery Factory. So many national investment projects starting up and going operational is unprecedented in the history of Ningxia's coal industry. These newly operational and new construction projects will increase Ningxia's overall production capability by 4.35 million tons and further perfect the mining districts' complete and basic installations. One-third of the 12 projects are coal processing and comprehensive utilization projects, which will make Ningxia's coal system production structure more rational; the pattern of "3 main parts": coal output, basic construction, and multi-level management of collective economics, will be fully formed, which will boost the rapid development of state-controlled large- and middle-sized coal enterprises, and continuously raise the economic profits of the whole coal industry. These new mines and factories are all built under mechanized and modernized standards of construction, and the new construction projects starting up are of advanced 1980's technological design, and 80 percent or more of their operations are mechanized.

Jiangnan's Largest Coal Base To Be Built in Panjiang Fields

926B0011A Guiyang GUIZHOU RIBAO in Chinese 29 Jul 91 p 1

[Article by Zhang Chongwei [1728 1504 0251]]

[Text] The Ministry of Energy Resources recently held an inspection conference at the Panjiang Bureau of Mining at which, in principle, it passed the Panjiang Fields Comprehensive Development Plan. It was agreed to expand the annual run-of-mine (ROM) production capacity of the

Panjiang mining district to 10 million tons, which will make it a super-large coal base south of the Yangtze River.

The Panjiang fields have abundant coal resources. Total reserves amount to 25 billion tons, and there are 7.52 billion tons of proven geological reserves up to an exploration depth of 500 meters. Geological conditions of the fields are stable. The coal seams, heavy and shallow, are easily exploited. Prospects are very bright.

The annual ROM production capacity of the Panjiang Bureau of Mining is 4.35 million tons. By improving, extending, and expanding existing pits, and by building two more trunk pits, the bureau will increase annual production by 2.7 million tons by the end of the Eighth Five-Year Plan. The design capacity of the entire field could reach 15 million tons by the end of the Ninth Five-Year Plan, and production capacity could exceed 10 million tons.

Based on the development setup of "the three main principles" of China's coal industry, the Panjiang fields have built four thermal power plants and set up a number of ferroalloy processing enterprises which process ferrous alloys (alloys with silicon, silicon and manganese, silicon and calcium, calcium carbide, etc.) and yellow phosphorus products. This has enabled the Panjiang fields to develop into a new style of multipurpose fields.

In the inspection conference of 14 June, the Ministry of Energy Resources was of the opinion that the conditions were ripe for large-scale development of the Panjiang fields. With the enhanced transport capability of the railway system in the southwest (particularly the construction of the lines from Nanning and Neijiang to Kunming), the difficulty of transporting coal out from the Panjiang fields will be alleviated.

The Panjiang Bureau of Mining began implementing the fields' development plan in 1989. The bureau raised 240 million yuan to improve, expand, and extend old pits. The Ministry of Energy Resources and the National Coal Corporation expressed deep satisfaction with the bureau's implementation of the fields' development plan. Some state investments in the expansion and improvement of five old mines in the Panjiang fields are now into the construction phase. First phase preparatory work for the construction of Jinjia and Xiangshui pits is now being stepped up.

Work To Resume on Huainan Major Coal Base

926B0011B Hefei ANHUI RIBAO in Chinese
2 Sep 91 p 2

[Article by Cao Peilin [2580 0160 6689] and He Jinchang [0149 6855 2490]]

[Text] All aspects of construction work on the key Huainan major coal base were suspended or partially suspended in July due to the flooding. Work gradually resumed in August, and by 20 August mine construction, equipment installation, and building construction were proceeding at normal pace. In the first 20 days of August, progress on construction of lanes was above quota. At present, the constructions of Pansan, Xieqiao, Xieli super-large pits are under way, and the construction of Paner pit is in second stage.

The construction of an auxiliary pit for the Huainan mine's Xieli pit, which is listed as a key project by the Ministry of Energy Resources, officially got under way on 31 July.

The Xieli pit is located in the eastern part of the western sector of the old mining area of the Huainan coal mine. It is a replacement pit for five old pits in the Xiejiaji-Liying district. Its annual design capacity is 3 million tons, and there are 280 million tons of recoverable reserves. Its construction is of great significance to the rational concentration of production activities in the Xieli district, and maintenance of the stable growth of production in the Huainan coal mine.

Oil and Gas Exploration Technology Proves Successful

40100018D Beijing CHINA DAILY (Economics and Business) in English 7 Jan 92 p 2

[Text] Remote-sensing technology used in explorations for oil and natural gas reserves passed appraisal conducted by a group of experts from the Chinese Academy of Sciences (CAS) in Beijing last weekend.

The evaluation was attended by nearly 100 research workers from CAS Institute of Remote Sensing Application and the Academy of Petroleum Exploration and Development under the China Petroleum Corporation in co-operation with 14 research institutes, according to a CAS official.

In the past four years, the technology has been tested in searching for oil and gas in about 30,000 square kilometres of land in the Tarim and Junggar basins in Northwest China's Xinjiang Uygur Autonomous Region, the official said.

The technology was proved to be 70 per cent successful. It has attracted the attention of Chinese experts and their colleagues in other countries.

Experts say the technology will be used in searching for oil and gas reserves in the Tarim Basin as China shifts the focus of its oil industry from East China to western regions.

Nine Oil Fields Earmarked for $2 Billion Development

40100009B Beijing CHINA DAILY (Business Weekly) in English 25 Nov 91 p 2

[Article by staff reporter Zheng Caixiong]

[Text] Guangzhou—Nanhai East Oil Corporation and a group of foreign companies plan to develop nine offshore fields during the Eighth 5-Year Plan (1991-95) to reach an annual production capacity of more than five million tons by the end of 1995.

An official from the corporation said that about $2 billion of investment will be used to develop these fields.

"By the end of 1995, Nanhai offshore oil fields will become the country's sixth largest oil production base. [quotation marks as published]

The Nanhai corporation is a subsidiary of China National Offshore Oil Corporation (CNOOC) and ACTOG—an operations group consisting of the Agip (Overseas) company of Italy, the Chevron Overseas Petroleum company, and Texaco Petroleum Maatschappij (Nederland) B.V.

Nanhai Offshore Oil and ACTOG also recently announced the start of production at the Huizhou 26-1 oil field.

Situated 175 kilometres southeast of Hong Kong in the South China Sea, the Huizhou field, with an estimated oil deposit of 37.64 million cubic metres and an expected annual production capacity of 1.5 million tons, is the second commercial offshore oil field to be jointly developed by the Nanhai East, CNOOC and ACTOG.

Total investment for the Huizhou field is estimated at $250 million. Agip, Chevron and Texaco each hold an equity interest of 16.3 percent, with the Nanhai corporation holding the remaining 51 percent.

The combined production from both the Huizhou 26-1 and the Huizhou 21-1 oil fields will occur in 1992 with an annual production capacity of 2.5 million tons.

Huizhou 21-1, with an oil deposit of 19.32 million cubic metres, was, in 1989, the first commercial offshore oil field to start production.

"Now, about 40 percent of our crude oil is being sold on the international market, while 60 percent sells on the domestic market," the corporation official said.

Other offshore oil fields which will be developed in the 1991-92 period include Xijiang 30-2, with an oil deposit of 30 million cubic metres, Xijiang 24-3, with 29.1 million cubic metres, Lufeng 22-1, with 31.86 million cubic metres, Lufeng 13-1, with a deposit of 25.32 million cubic metres, and Liuhua 11-1, with a deposit of 207.7 million cubic metres.

The official said that Liuhua 11-1 oil field, the largest to be discovered in recent years, is scheduled to start production in 1994.

Agreement Reached on Search for Oil in Bohai

40100009A Beijing CHINA DAILY (Economics and Business) in English 25 Nov 91 p 2

[Article by staff reporter Xu Yuanchao]

[Text] American Texaco and Australian BHP oil companies have reached an agreement with China to explore for oil and natural gas in Bohai Bay.

The oil contract was signed in Beijing on Saturday between the China National Offshore Oil Corporation (CNOOC) and Texaco Petroleum Maatschappij (Nederland) BV, a subsidiary of Texaco Inc of the United States, and BHP Petroleum (China) Inc of Australia.

Contract Area

The contract area covers 5,000 square kilometres in shallow waters of Bohai Bay, about 120 miles (190 kilometres) east of Tianjin.

According to the contract, Texaco and BHP will hold equal shares in the project.

A CNOOC official said the oil contract is the seventh one that the corporation has signed with foreign oil firms this year.

Texaco and BHP have completed a one-year joint study on geological conditions in 8,870 square kilometres of eastern Bohai Bay, the official said.

Texaco, as the operator, will be working in co-operation with the Bohai Oil Corporation, a regional subsidiary of CNOOC, he said. The seismic survey is scheduled to begin early next year.

Experts say the Bohai Basin, covering 51,000 square kilometres in Bohai Bay, is adjacent to three major onshore oilfields of Liaohe, Dagang and Shengli.

It was the first offshore basin where China did geological prospecting for oil and natural gas.

Since 1980, oil companies from Japan, France, Britain, the United States, Norway and Malaysia have participated in exploration for oil reserves, with notable progress.

Three offshore fields in the Sino-Japanese co-operation areas turn out about 1 million tons of crude oil a year.

CNOOC's own efforts have found a condensate oilfield, a light crude oilfield, and two small fields, which are expected to go into production in 1992.

Four High-Yield Oil Fields Discovered in Tarim

926B0007C Beijing RENMIN RIBAO in Chinese 14 Sep 91 p 2

[Article by Zhang Heping [1728 0149 1627] and Fei Weiwei [6316 0251 0251]]

[Text] The goal of discovering reserves during the Eighth 5-Year Plan sufficient to produce 5 million tons of crude oil in the Tarim exploration area has basically been achieved in the first year of the plan. In the past two or three years, 19,000 workers and staff from around the country participating in the Tarim campaign have discovered four oil and gas fields in Lunnan, Donghetang, Jilake, and Sangtamu. They have achieved preliminary proof of significant petroleum reserves.

In the Lunnan district, which is in the northern part of the basin, the area of oil and gas-bearing structures so far discovered amounts to 500 square kilometers. Two zones of enrichment have been found. In the Donghetang district, payable exploration territory measures 500 square kilometers in area, and a high-yield ready-to-recover oil field has been found. In the Jilake district, preliminary control has been achieved over an oil and gas-bearing territory of 70 square kilometers, and strong oil and gas flows have been obtained at three exploratory wells.

In conjunction with vigorous efforts to step up exploration, since the latter half of last year the Tarim Petroleum Exploration and Development Coordination Department opened up a production development testing zone in a 30-square-kilometer oil and gas-bearing area in the Lunnan district. A number of oil wells there are already in production, and a preliminary production capacity of 1,600 tons per day has been achieved. This reporter noticed that installation of support infrastructure at the oil fields (water lines, electricity, roads, communications) is proceeding apace. Construction of the oil pipeline from Lunnan to Korla is accelerating, and it will enable crude oil production capacity to reach 600,000 tons this year.

Everything is a scene of bustling activity in the Tarim exploration area. Coordinated use is being made of 10 new technologies, including digital seismic surveying, composite well logging, digital well logging, optimized-parameter high-speed well drilling, and deep well pressure-cracking and acidification. Tarim currently ranks near the top nationally in deep well drilling speed, the time required to drill one well, and drilling quality, and in some cases it is on a par with advanced world-class standards.

Junggar Oil, Gas Exploitation Taking Shape

926B0007A Urumqi XINJIANG RIBAO in Chinese 15 Aug 91 p 2

[Article by Zhang Ke [1728 0344]]

[Text] The push for deeper oil and gas exploration in Junggar is now fully under way. Area exploration programs and seismic study teams are now in place as specified in the overall deployment plan, which calls for "the northwest edge to be deepened, the eastern sector to be expanded, breakthroughs to be achieved in the southern edge, and reconnaissance to be carried out in the hinterland." There are now 19 wells being drilled, and indications of oil and gas have been discovered in some core samples.

The area of the sedimentary rock in Junggar is 130,000 square kilometers. The northwest edge and the eastern sector are now the main oil-producing areas in Xinjiang, with the fourth highest output in the nation. There have been many setbacks in the exploration of the southern edge and the hinterland, no breakthroughs have been achieved so far. In order to search for new, large oil and gas reserves and to fulfill quotas, the Xinjiang Petroleum Management Bureau has made it the key task of the Eighth 5-Year Plan to carry on oil and gas exploration in Junggar at deeper levels. Tapping the expertise of its departments in charge of exploration research, geological studies, drilling, and well logging, the bureau has carefully mapped out the areas to be explored this year, and will swing into action on the plan very soon.

The northwest edge and the eastern sector were developed relatively early on, and the main oil-producing layers have always been believed in the limestone series and the upper Permian series. Oil field researchers have assessed deeper rock series in this area, such as the Jurassic series. At the same time, they have also searched for areas in which to make new breakthroughs, providing information that will help to expand the oil-bearing area. The geological structure of the southern edge is complex; numerous reverses had been suffered in the Korgas exploration district, but U.S. mud specialists have declared that the stratigraphy here is the best in the world. Working together, the Xinjiang Well Drilling Corporation and the Well Drilling Technology Institute have successfully penetrated complex stratigraphy at Korgas Well No. 8A, and drilling at their other exploratory wells is progressing normally. Pencan Well No. 2, which is being drilled deep into the basin hinterland in China's second largest desert (the Desert of Gurbantunggut), is approaching its target layer.

It is reported that indications of oil and gas have been discovered in the drill cores from several important exploratory wells, including Fengnan Well No. 1 on the northwest edge, Pencan Well No. 2 and Caican Well No. 2 in the basin hinterland.

Oil-Rich Fields Discovered in Turpan-Hami Area

926B0007B Beijing GUANGMING RIBAO in Chinese 2 Sep 91 p 1

[Article by Liu Sa [0491 7366]]

[Text] Turpan and Hami, which are renowned for their abundant output of grapes and honeydew melons, are going to make a greater contribution to the fatherland: a special campaign to explore for oil in the Turpan-Hami area has yielded extremely encouraging results. In four years, four oil fields with rich reserves have been discovered, and production there this year has totaled 200,000 tons. Annual production is expected to reach 4 million tons by the end of the Eighth 5-Year Plan, ranking this field fourth in the nation behind Daqing, Shengli, and Liaohe. Authoritative sources have informed this reporter that this important success is the crystallization of technological progress in China's petroleum industry.

During the 10 years between 1954 and 1964, petroleum units carried out arduous exploration and development work in this area. Although they drilled 138 wells and discovered two small oil fields, they concluded that the area was not worth developing. It was said at the time that "the Jurassic is unfriendly." In the 1980's, as the focus of the petroleum strategy shifted westward, reassessment of the Turpan-Hami oil fields found its way back onto the agenda. Since 1987, 15,000 workers and staff from the Yumen Petroleum Management Bureau, the Materials Exploration Bureau, the Beijing Petroleum Institute, the North China Petroleum Bureau, and the Changqing Exploration Bureau have come to work on the front lines of the campaign. This time, modern technology has been used in every aspect of the work, from exploration, well drilling, logging, and oil testing to development. It is not that the Jurassic series had no oil; the technology and equipment used before were just not good enough.

Three-dimensional seismic surveys, a 1980's technology used in exploration, yields a three-dimensional image of any geological layer. Not only does it greatly increase the precision of exploration work, it also provides a solid foundation for follow-up work. Some oil horizons in the Turpan-Hami oil field are up to 3,200 meters deep, which was beyond the reach of the old equipment. All the equipment used by the 44 teams taking part in this campaign can drill deeper than 3,000 meters. In the past, a drill bit only lasted a few hours, and it took several dozen bits to drill a single well. A bit now lasts four or five days, and it only takes a few bits to drill a well. The use of high-pressure borehole injection technology has enabled the various drilling teams to set new records for daily advance, monthly advance, time required to drill a single well, and total drilling time. Some teams have set national records. The use of pressure cracking technology can more than double oil well output. The oil field had already produced more than 90,000 tons at the filing of this report, of which over 8,000 tons represented additional production yielded after this new technology was adopted in parts of the oil field.

It is reported that the teams have cut investments-per-100-million-tons-of-reserves in half by using eight major new technologies, including "early assessment technology for horizontal calculation of reservoirs," "totally closed flow at ordinary temperature," and automated control.